EXAMINING THE CULTURAL MEASUREMENT EQUIVALENCE OF THE PRACTICE ENVIRONMENT SCALE – NURSING WORK INDEX

By

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Abstract

The study aimed to evaluate the cultural measurement equivalence of the Practice Environment Scale – Nursing Work Index (PES-NWI) between two groups, registered nurses (RN) reporting as Asian/Pacific Islander and White/Non-Hispanic.

The nursing workforce is becoming diverse with the passing of time. This may lead to complexities of measurement in samples that are diverse. Undertaking intricate methods in determining cultural measurement equivalence of instruments would enhance reliability of pooled results of samples composed of various races and ethnicities and allow for cross cultural comparison.

This secondary data analysis was derived from data collected by the National Database of Nursing Quality Indicators™ (NDNQI®). NDNQI® is the largest repository of its kind and collects data reflecting the nursing workforce. Data from the PES-NWI, RN characteristics, unit characteristics, and hospital characteristics encompassed the overall dataset. The study was a descriptive design with psychometric evaluation at the individual level that integrated case matching of participants.

The analysis of the secondary data consisted of evaluating differing group responses to the PES-NWI, measurement invariance (configural, weak, and strong invariance) testing, and validity testing of the PES-NWI. Invariance testing was conducted by using multi-group confirmatory factor analysis. Validity testing consisted of a known group approach, Magnet® status vs. non-magnet status (independent t-test) of the subscale means within each group.

Registered nurses reporting as Asian/Pacific Islander responded to the PES-NWI more favorably than registered nurses reporting as White/Non-Hispanic. There was noted adequate model fit of the PES-NWI in both individual groups and the PES-NWI demonstrated cultural measurement equivalence (measurement invariance). The PES-NWI was found to be valid in

registered nurses reporting as White/Non-Hispanic. The majority of the subscales were statistically significantly different except for two subscales addressing hospital affairs and nurse managers.

This study adds to the existing knowledge regarding the psychometrics of the PES-NWI and allows for cross cultural comparisons of the latent factors between registered nurses reporting White/Non-Hispanic or Asian/Pacific Islander. Caution should be taken when evaluating cross cultural comparison results regarding the two subscales, hospital affairs and nurse manager.

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CHAPTER 1

Introduction

The nursing workforce is becoming more racially and ethnically diverse with the passing of time. The increase in diversity is in response to several factors. According to Pittman (2013), countries such as the Philippines and India overproduce the number of nurses with the assumption that a portion of graduates will migrate to other countries such as the United States (U.S.). Diversity is enhanced by hospital administrators desiring to recruit outside the U.S. when needing to fill vacancies. Furthermore, there has been an influx of individuals of the Latin origin entering the U.S. It is estimated that by 2050, 30% of the U.S. population will be Latino (Monceri, 2012). In addition, pending U.S. immigration reform also may contribute to the diversity of the nursing workforce.

This diversity is seen as a benefit for the nursing workforce. The Institute of Medicine (IOM, 2003) encourages diversity in the healthcare workforce believing it would enhance and improve delivery of care and patient outcomes. However, the increasing diversity may pose a challenge to those who conduct nursing workforce research using instruments such as Lake's (2002) Practice Environment Scale – Nursing Work Index (PES-NWI). For example, challenges may occur in the measurement of workplace environment constructs and their dimensions that largely are based on individuals' perceptions. In the context of the diverse workplace, attitudes and behaviors of employees may be influenced by their cultural beliefs and may be influenced by stressors of integration and inclusion of foreign-born employees (nurses) within the workplace (Pasca & Wagner, 2011). Due to workplace attitudes, behaviors, and perceptions influenced by these factors, cultural measurement equivalence (CME) of research instruments should be considered (Pena, 2007).

In this chapter, the study aim and study background issues related to CME including linguistic equivalence (equivalence in language translation and context of items) process of instruments, cultural bias of items and constructs, and cultural bias of Likert-type scales will be described. The key terms, assumptions, and introduction to a conceptual framework used to guide the study also will be included.

Problem Statement

The Health Resources and Services Administration (HRSA) conducted the National Sample Survey of Registered Nurses (NSSRN) every four years since 1977. The NSSRN results have been vital in identifying the characteristics of the nursing workforce in the U.S., including information on the diversity of the nursing workforce. According to the 2008 NSSRN results, approximately 15% of the U.S. nursing workforce reported their race or ethnicity as Black/African American, Asian, or Hispanic/Latino (approximately 6%, 6%, and 4%, respectively). This has increased from the 2004 NSSRN results where 9% of the nursing workforce reporting an alternative race or ethnic background of Black/African American (4%), Asian (3%), and Hispanic/Latino (2%). The 2008 NSSRN was the last survey with results published. Although the NSSRN no longer will be administered, HRSA will be collecting information about the nursing workforce on a non-regular basis (Auerbach, Staiger, Muench, & Buerhaus, 2012). Auerbach and colleagues report that the HRSA is examining nursing workforce data at the state level. Information regarding reasons for discontinuing the survey is not made clear in the article or through the HRSA website. However, the U.S. Department of Health and Human Services, HRSA, and the National Center for Health Workforce Analysis (2014) have released initial results from the 2012 National Sample Survey of Nurse Practitioners.

Although the NSSRN provided important information on the description of the nursing workforce, other information that impacts the workforce such as job satisfaction, nursing

practice/work environment, intent to leave job/profession, and patient outcomes were not incorporated in the survey. The National Database of Nursing Quality Indicators™ (NDNQI®) has the capability to collect information on nursing workforce characteristics to include (but not limited to) nursing-sensitive data such as job enjoyment, practice environment characteristics, and patient outcomes such as unit/hospital acquired pressure ulcers. However, information from instruments focusing on job enjoyment and practice environment characteristics requires responses via perception that may be difficult to measure in an increasingly racially and ethnically diverse workforce.

Researchers using instruments that are not sensitive to culturally diverse samples may introduce systematic error in their studies. If factor analysis results reflect the largest race and/or ethnicity of the sample, CME may be threatened when examining construct validity. In the U.S., the largest racial group comprising the nursing workforce is White/Non-Hispanic. This may serve as a hindrance for nursing units or hospitals when making appropriate decisions based on research evidence in quality improvement activities in geographic regions where diversity is heavy. Based on the U.S. Census Bureau data (2014), between April 2010 and July 2013, the greatest diversity of the population was in the eastern and southern regions of U.S. and in the states of Alaska and Hawaii. The assumption is that the future nursing workforce also would be more diverse in these areas. Another assumption is that nurses from foreign counties may desire to work in regions of U.S. where their race or ethnicity may be represented more highly.

Survey instruments require evidence of reliability and validity to help reduce measurement error (i.e., random and systematic error). The validity of an instrument is the degree to which it measures the theoretical construct it is intended to measure (Cronbach & Meehl, 1955; Kimberlin & Winterstein, 2008). Before validity of the instrument can be established, however, reliability of the instrument must be examined. Stability and consistency

in measurement, aspects of reliability of a measure, are crucial when applied in certain conditions, and across samples or time. When administering a survey to a large sample that is diverse in race and/or ethnicity it is crucial to determine if validity and reliability results (i.e., factor analysis and internal consistency, respectively) would be similar across the differing race or ethnicities so that pooled estimates would be reflective of the overall sample (e.g., nursing workforce). This is a necessary process in determining CEM of an instrument.

Background and Significance of Problem

Cultural Measurement Equivalence

Cultural measurement equivalence refers to how individuals of different countries or races and/or ethnicities interpret the items of a measurement instrument. Interpretations about item meaning by individuals may affect how he/she responds (Pena, 2007). Cultural measurement equivalence is not the same as linguistic equivalence. Linguistic equivalence is referred to as translated words that are the same in the original language and the translated version. However, CME may begin with linguistic equivalence. The common process to achieve linguistic equivalence in an instrument is the use of an expert for forward translation then back translation followed by further scrutiny of items for comprehension and cultural factors (Dunckley, Hughes, Addington-Hall, & Higginson, 2003; Pena, 2007). Although words may be translated correctly, translated words may invoke an emotion that may influence the individual in responding to an item in a certain way. Wording that influences a response instead of the intended item disrupts functional equivalence. Translated words must function equally to prevent bias in measurement.

Measurement equivalence of instruments requires individuals to respond using the same standard of measurement. Individuals may have different interpretations of self-reporting measurements. Responding to scales of satisfaction or frequency has some measure of

subjectivity. How someone self-reports is influenced by culture. It is through the process of testing instruments between cultures one may compare and contrast psychometric results in determining cultural, measurement equivalence (Pena, 2007). Confirmatory factor analysis is the method that was used by Hsueh and colleagues (2005) to assess and determine cross-cultural equivalence of an instrument and is recommended by Teresi (2006) and Stommel and colleagues (1992).

Construct and Item Bias

Measuring a construct in a sample that is racially and ethnically diverse may be difficult as each individual may respond with their own definition of the construct despite having the operational definition provided. In addition, if the construct is measured using single or multiple dimensions, it may not measure fully the construct of interest because of varying degrees of how the construct is internalized by the individual. Due to the racial and/or ethnic diversity of the sample, cultural bias in the measurement may arise unintentionally.

There are many factors that may contribute to potential cultural bias in using instruments across cultures (Sindik, 2012). Bias does not necessarily stem from a poor instrument; the bias may arise from the participants' characteristics (influenced by culture) that then may lead to the bias in the construct that is being measured as well as item content bias (item bias). Construct bias can occur when the construct under investigation has different meaning across different cultures, the dimensions of the construct may differ across cultures, or the dimensions that are being measured may not represent the construct. Item bias occurs when the meaning of the item differs across cultures.

Response Scale Bias

The Likert scale was developed by Rensis Likert in 1932 with the intent to develop a reliable method in the measurement of attitude that was simpler than the Thurstone method.

Initial testing of the Likert scale occurred decades ago with the majority of the population tested being white, male, university students (Likert, 1932; Likert, Roslow, & Murphy, 1934). The testing included administration of an instrument (i.e., Survey of Opinions) that measured attitudes about various issues such as (but not limited to) economics, politics, and international matters. Items within the scale allowed individuals to report their perceptions about item content using a 5-point scale with a neutral point (*strongly approve, approve, undecided, disapprove, and strongly disapprove*, Likert, 1932, p.15,). Depending on the item, strongly approve would have the value starting at "1" or ending at "5". According to Likert, a 5-point scale had potential for normal distribution similar to a multiple choice item with five responses. Results were summated rather than calculating a mean. In his 1932 work (p. 52), Likert reported that the developed attitude scale may not be applicable to other cultures; this is of major interest and a contributing factor to the purpose of this study. Likert-type scales are similar to the original Likert scale but vary in response option ranges, such as 3-point, 7-point, or 11-point. They have different anchors such as (but not limited to) strongly agree to strongly disagree or very frequently to never and may not hold a neutral point. Results may be summated or averaged. The scale may be treated as interval, ordinal, or nominal.

The Likert scale has been thoroughly examined demonstrating stability and reliability; however, there are four concerns. First, culture may evolve over a period of time. Second, populations may become more racially and/or ethnically diverse. Third, being culturally sensitive did not have the importance it has now. Fourth, what we know about the Likert scale is truly generalized to the study population for which it has been tested on.

Flaskerud (1988, 2012) and Sinidik (2012) explained that instrument bias may exist when respondents from two cultures differ in responses. These differing responses may not arise from the construct or item content but rather from the use of Likert or Likert-type scales. Differing

cultures may not understand the Likert or Likert-type scale concept (i.e., variable ratings as opposed to dichotomous ratings) or find it difficult to respond in a genuine manner. This type of bias may lead to extremes or consistently neutral responses. According to Flaskerud (2012), Likert-type scales should be used cautiously with participants of diverse races and ethnicities (non-Western). Addressing cultural differences in perception of constructs being measured and cultural bias in use of Likert-type scales would aid in establishing strength of the tool and allow translation of results into practice.

Purpose and Significance of the Study

Using a secondary analysis of data from the National Database of Nursing Quality Indicators™ (NDNQI®), I tested the Practice Environment Scale-Nursing Work Index (PES-NWI) for measurement equivalence across two groups, registered nurses reporting as Asian/Pacific Islander (RNs-API) or White/Non-Hispanic (RNs-WNH) in the U.S. This was considered important as results from this survey are used in developing interventions to improve nursing work environments across regions in the U.S., some of which are more culturally diverse than others. I also examined item response from each group and for consistent factor structure that would provide insight regarding the construct and measurement equivalence.

The NDNQI® currently serves as the sole entity that collects data on the nursing workforce and is the largest repository of its kind. This is important because the NSSRN has been discontinued by the Health Resources and Services Administration and data collected by the U.S. Census Bureau is not specific to nurses (Auerbach, Staiger, Muench, & Buerhaus, 2012). The NDNQI®, originally directed by the American Nurses Association, was established in 1994 with the intent to examine the association between patient outcomes and nursing care (American Nurses Association, 2014). The NDNQI® is now directed by Press Ganey®. A large number of hospitals (> 2,000) participate in the data collection for indicators and/or survey

completion of the Practice Environment Scale – Nursing Work Index, Job Enjoyment, and items on RN characteristics (Press Ganey Associates, 2014C). This study used a secondary data analysis and data were derived from the NDNQI® that allowed for a large sample to be used (specific to nurses) in determining consistency in the factor analysis of the PES-NWI. This study addressed measurement equivalence issues faced in cross-cultural research, especially in a nursing workforce and large-scale outcomes research.

Study Aim

The aim of this study was to determine the measurement equivalence of the Practice Environment Scale–Nursing Work Index (PES-NWI) using two racial and/or ethnic groups (RNs-API and RNs-WNH) within a large sample of nurses across the U.S. who participate in the NDNQI® (see Figure 1); and thus, determined if construct validity of the instrument would be consistent in both groups.

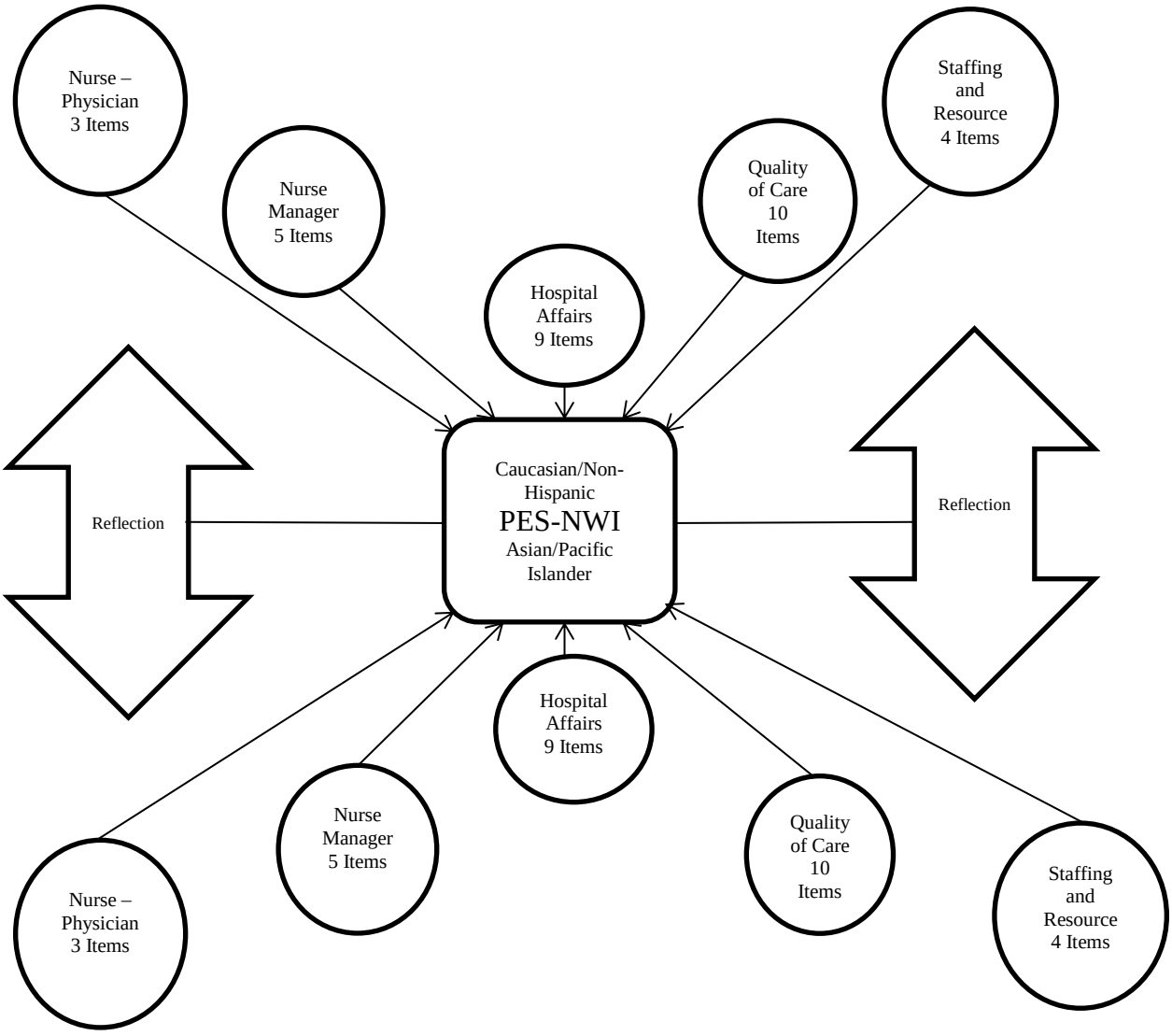
Research Questions

The research questions guided the study (questions 1 & 2 will help in examining measurement equivalence):

1. Are there differing item response styles to the PES-NWI across the two groups, registered nurses reporting as White/Non-Hispanic (RNs-WNH) or Asian/Pacific Islander (RNs-API)?
2. Is there measurement equivalence of the PES-NWI between two groups—RNs-WNH and RNs-API?
3. Are there mean subscale score differences for the PES-NWI between RNs working in Magnet® hospitals versus non-magnet hospitals within in each group—RNs-WNH and RNs-API?

Figure 1

Measurement Equivalence of the Practice Environment Scale – Nursing Work Index (PES-NWI)



Theoretical Framework

The guiding theoretical framework for this study was Schwartz's Theory of Basic Values (1992, 1999) that has evolved over time (Schwartz, 2012, 2012a). The foundation of Schwartz's theory is that all cultures share common values. Values may overlap or be incongruent to each other. According to Schwartz, values are what motivate us to respond in a certain manner and are the underpinning of individuals' attitudes and perceptions. Attitudes and perceptions require evaluation that is guided by values. Values provide the guiding measuring stick.

The theory is based on six premises that values: (a) elicit an emotional response, (b) motivate individuals to pursue goals, (c) extend beyond situations or actions, (d) guide the evaluation process (e.g., good vs. bad), (e) are ranked by individuals regarding levels of importance, and f) highly important to individuals will most likely guide actions. In the original work, Schwartz (1992) identified 10 values that are universal to potentially all cultures. These 10 values fall within four dimensions known as openness to change, conservation, self enhancement, and self-transcendence. For this study, the dimensions of openness to change and conservation are examined. The two dimensions are polar opposites of each other.

The dimensions (i.e., openness to change and conservation) focus on how individuals relate to others or groups (Schwartz, 1999) and often are explained as individualism versus collectivism. Collectivism is explained by the dimension, conservation. Of the 10 values that Schwartz identified, the three values of tradition, conformity, and security fall within the conservation dimension. Tradition consists of integration and acceptance of religious ideas and customs. This value overlaps with the values of conformity and security. Conformity implies the need to practice self-discipline for the good of the group. This value is a hallmark for the characteristic known as loyalty. Security focuses on peace and safety both at the individual level

and the group level. Within this dimension, self-pleasure may be abandoned for the sake of the group (Schwartz, 1999).

Individualism is explained by the dimension, openness to change. There are two values (i.e., stimulation and self-direction) that fall within this dimension. A third value partially overlaps with this dimension and it is known as hedonism. Self-direction consists of the desire for independence. This value includes freedom of thought and autonomy. Stimulation is necessary for positive growth through spontaneity, excitement, and challenge. The third value, hedonism, overlaps with this dimension that consists of self-gratification, enjoyment, and pleasure.

Definition of Terms

Definitions are provided for the purpose of clear and consistent understanding of terms:

Values: "…beliefs linked inextricably to affect (Schwartz, 2012, p. 3)."

Culture: Characteristics such as values, behaviors, attitudes, and customs of a group of people.

Cultural Bias: Perceptions and interpretations of events influenced by one's own culture that may be conscious and unconscious.

Cultural Sensitivity: The ability to have the knowledge, understanding, consideration, respect, and adapt to other's cultural differences (Foronda, 2008).

Practice Environment: "Organizational characteristics of a work setting that facilitate or constrain professional nursing practice" (Lake, 2002, p. 178).

White/Non-Hispanic: Individuals that are Caucasian (from a white race), and not Hispanic or Latino.

Asian/Pacific Islander: "Refers to a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, e.g., Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam" (Hoeffel, Rastogi, Kim, &

Shahid, 2012, p. 2).

Measurement: "…the assigning of numbers to observations in order to quantify a phenomenon" (Kimberlin & Winterstein, 2008, p. 2276).

Measurement Equivalence: referred to construct comparability between groups and synonymous with measurement invariance (Little, 2013).

Validity: instrument measures the theoretical construct it intended to measure (Cronbach & Meehl, 1955; Kimberlin & Winterstein, 2008).

Reliability: "…the consistency of a measurement procedure and indices of reliability describe the extent to which scores produced by the measurement are reproducible" (John & Benet-Martinez, 2000, p. 342).

Study Assumptions

The following assumptions applied to this study:

1. Behaviors of individuals (nurses) are influenced by the culture and values they align with.
2. The nursing practice environment is made up of dimensions to explain the functionality of the practice environment.
3. The nursing practice environment emerges from values, culture, socialization, and interaction of nurses.

Limitations

Although this was a secondary data analysis, the original data were collected to investigate the same construct, i.e. the nursing practice environment. However, I focused on the possibility that race and/or ethnicity may influence responses to items of the PES-NWI. Another potential limitation was the constraint of the secondary analysis study design that could have on determining the extent of cultural influence on the results. The methodology for this study was a

limitation; that is, a mixed-methods study would enhance the results by providing potential explanations to quantitative results that cannot be achieved through the secondary analysis.

Summary

Projections indicate that there will be an increase in racial and/or ethnic diversity in the nursing workforce. This may pose a challenge for investigators studying the workforce and making assumptions due to cross-cultural issues. Measurement tools such as the PES-NWI only may reflect the perception of the work environment by nurses who are White/Non-Hispanic as they are the majority group in the work force. Thus, it is important to examine the cultural measurement equivalence of the PES-NWI.

Chapter II

Literature Review

In Chapter II, an overview of the Practice Environment Scale – Nursing Work Index (PES-NWI) by Lake (2002) is presented. The five dimensions (subscales) that compose the scale will be discussed. A review of literature will be presented on the PES-NWI focusing on the factor structure of the instrument and the items. The review of literature will focus on psychometric studies conducted in U.S. and Asian countries. Thereafter, further information regarding Schwartz's Theory of Basic Values and how it is associated with individualism and collectivism will be discussed. Response styles also will be addressed and how it is related to individualism and collectivism.

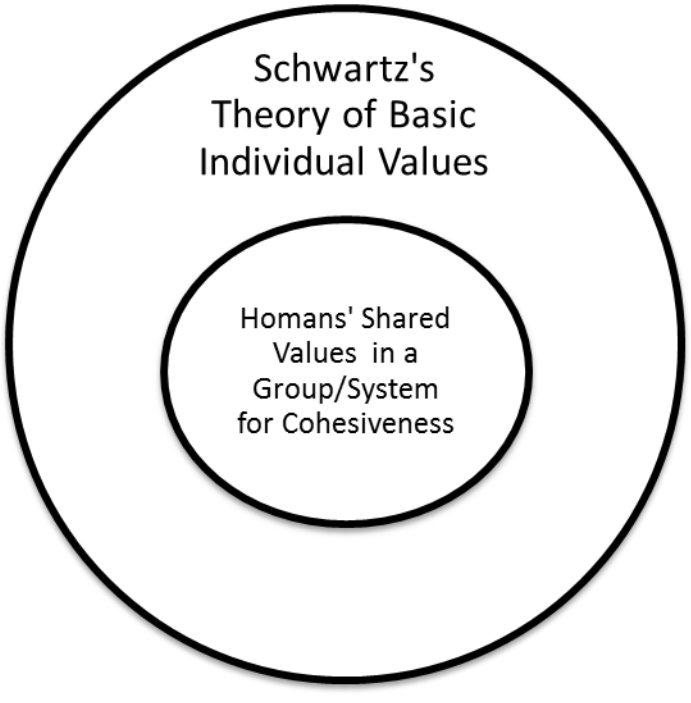
Practice Environment Scale

The PES-NWI (Lake, 2002) is derived from the Nursing Work Index (NWI) originally developed through work by Kramer and Hafner (1989) and later revised by Aiken and Patrician (2000). Kramer and Hafner's (1989) work was guided by a theoretical framework that individuals in a group or system (e.g., healthcare facility) shared common values to create cohesiveness (Homans, 1958). Figure 2 shows my depiction of how Homans' theoretical framework relates to Schwartz's Theory of Basic Individual Values. This index was developed in response to a nursing shortage and vacancies at hospitals. Forty-six hospitals known for their ability to attract and retain nurses were evaluated for their organizational characteristics. The existing literature on organizational characteristics also was examined. These hospitals have been identified as the original magnet hospitals and demonstrated the common denominators of nursing leadership, quality patient care, nursing autonomy, staffing on units, and nurses' schedules. The index consisted of 65 items. The 65 items were responded to from three different perspectives, (a) "how important the factor is for job satisfaction (JSV)", (b) "how

important the factor is for producing quality nursing care (PPV)", and (c) "the extent to which the factor is present in the current job" (pp. 173-174). The coefficient alpha (α) was greater than .80 for each scale (JSV, PPV, JSV + factors present in current job, and PPV + factors present in current job). Criterion validity was tested by two methods. The first method examined the relationship between the hospital mean score of job satisfaction plus factors present in current job and the yearly turnover rate. The second method was examining the relationship between producing quality nursing care plus factors present in the current job and RNs performance evaluation scores.

Figure 2

Depiction of the Relationship of Schwartz's Theory of Basic Individual Values and Homan's Shared Values



Note. This depiction integrates the works by Homans (1958), Schwartz (1992, 1999, 2012, 2012a), and Schwartz and colleagues (2012). The depiction represents that many individuals make up a culture and there are cultures within cultures.

Aiken and Patrician (2002) revised the NWI known as the Revised Nursing Work Index (NWI-R), a 57-item instrument with 4-point Likert-type scale (*1 = strongly agree to 4 = strongly disagree*). The investigators retained only one of the three perspective statements, "the extent to which the factor is present in the current job". The investigators placed emphasis on hospital traits rather than the RN. The majority of items (55) were retained from the NWI. Four subscales were theoretically identified as (a) autonomy, (b) control over the practice environment, (c) nurse-physician relationship, and (d) organizational support of the caregivers. Chronbach's α for the individual level subscales was equal or greater than .75 (an α value was not provided for the organizational support of caregivers subscale) and equal or greater than .84 for all subscales when aggregated to the unit level. Criterion-related validity was substantiated by associating the NWI-R scores with patient (e.g., mortality, satisfaction) and nursing outcomes (e.g., needle sticks, burnout).

Lake (2002) then conducted research to generate the PES-NWI from the NWI with the intent to identify distinct dimensions to measure the unpredictable nursing work environment and make an instrument generalized to the workforce. In the process of developing the PES-NWI, Lake examined each item for inclusion in the PES-NWI, and 48 items then were analyzed via exploratory factor analysis using principal axis factoring (N = 2,336). The factors then were rotated using Varimax and Promax approaches. The optimal solution consisted of 31 items for five subscales (dimensions) identified through Varimax rotation. The five subscales were named based on the items that fell within each factor known as (a) nurse participation in hospital affairs, (b) nursing foundation for quality of care, (c) nurse manager ability, leadership, and support for nurses, (d) staffing and resource adequacy, and (e) collegial nurse-physician relations.

The first dimension, nurse participation in hospital affairs, focuses on the nurses' role in the hospital, such as participating on committees, policy development, and governance. The

second dimension, nursing foundation for quality of care, contains methods in which quality care is influenced by such things as a philosophy of nursing, quality assurance/improvement participation, competence, and staff education. The third dimension, nurse manager ability, leadership, and support for nurses, examines the nurse manager's characteristics and how the individual supports the nurses and the unit. The fourth dimension, staffing and resource adequacy contains items regarding how well the unit is staffed, and if enough staffing is present to allow nurses to spend time with their patients and address issues that arise. The fifth dimension is self-explanatory and focuses on the positive relationship between physicians and nurses (collegial nurse-physician relations). A final oblique multiple group principal component analysis then was completed and supported the exploratory factor loadings of items on the respective five subscales.

Reliability of the subscales then was evaluated using Cronbach's alpha at the individual level and intraclass correlation at the hospital level. All subscales had a Chronbach's alpha equal or greater than .80 with the exception of the fifth subscale, collegial nurse-physician relations (α =.71). The interitem correlations ranged from .64-.91 and the intraclass correlations ranged from .88-.97.

For the purposes of validity testing, the mean of each subscale was used. The process consisted of creating the mean of each item at the hospital level and then obtaining a mean across the items for each subscale for each hospital. Construct validity was determined by examining the significant statistical differences between the magnet hospitals and non-magnet hospitals (n = 1,610 and n= 689 respectively). This is referred to as construct validity through contrasting groups (Waltz, Strickland, & Lenz, 2005, pp. 156-157); however, Lake (2002) refers to the construct validity as a known-groups approach (p. 180). There was a statistically significant difference (p <.001) for each subscale between the magnet and non-magnet hospitals. The

magnet hospitals had higher mean scores for each subscale. Lake (2002) identifies limitations to this study. The sample was from hospitals located in Pennsylvania (a focused geographical site). Nurses working in rural settings or for-profit hospitals were not represented. The demographic breakdown was not provided regarding race and/or ethnicity.

Methodology for the Literature Review on the Practice Environment Scale

The review of literature was conducted using the PubMed database. The major subject heading was "Practice Environment Scale". The data base provided 87 articles for the subject heading. Titles of the articles and abstracts were evaluated for inclusion or exclusion in this review of literature (see Table 1). Thereafter, articles were examined only for factor analysis information.

Of the 87 articles, five articles met the criteria listed in Table 1. Studies completed in the U.S., except for one, resulted in the same factor solution, i.e. the five subscales described previously. The studies by Raju and colleagues (2014), Haven and colleagues (2012), and Gajewski and colleagues (2010) obtained the same five subscales; however, Raju and colleagues identified two items that made no difference if retained or deleted (see Table 2). The investigators explained that the leadership structure is different between military and civilian hospitals. In military hospitals, there is higher collegiality between healthcare workers because leadership is based on military rank and not professional hierarchy (nurses subordinate to physicians).

Table 1

Review of Literature Inclusion/Exclusion Criteria

Inclusion Criteria	Exclusion
English language	Non-English language
Studies in US and Asia	Studies conducted in countries other than U.S., Asia, and Pacific Islands
Reliability/Validity Studies	Studies using the "PES-NWI" and not reporting factor analysis
Studies examining specific variables but conducted a factor analysis	Studies using a PES not derived from the NWI
Studies using the PES-NWI or NDNQI® PES-NWI derived from Lake/s work	Use of the PES-NWI to create another instrument
	Studies intentionally altering the PES-NWI by adding subscales
	Studies using selected parts of the PES-NWI
	Studies with PES-NWI translated but no factor analysis.
	Review of literature or systematic reviews

Note. PES-NWI = Practice Environment Scale – Nursing Work Index.

Other studies that sampled from the Asian/Pacific Islander population had many items that loaded weakly or cross loaded. This most likely led to the altering of subscales. Liou and Cheng (2009) reported that items loading differently onto subscales may be due to nurses from a collectivist culture working in an individualistic culture. The investigators changed the Likert-type scale to a 5-point scale justifying that nurses of Asian/Pacific Islander culture preference to select the mid-point. In addition, nurses educated outside the U.S. may have a different understanding of the role of the registered nurse and the manager. The investigators recommended a larger scale study incorporating more states. Similarly, Chiang and Lin (2008) reported that items loading differently on the factor may be due to item interpretation or meaning may be different in the Taiwan nursing sample.

Table 2

Review of Literature: Practice Environment Scale – Nursing Work Index (PES-NWI) Factor (Subscale) Structures from U.S. and Asian Studies

Author/s	Location; Sample Size (*N*); Ethnicity/Race Description; Level of Response Type of Analysis Pre: PES-NWI Subscales; Number of Items; Response Choice Scale Size Post: PES-NWI Subscales after Analysis
Raju, Su, & Patrician (2014)	U.S. – Military Hospitals; *N* = 888; No Ethnicity/Race Description; Individual level Item Response Theory Pre: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse–Physician Relationships; 31 Items; 4-Point Scale Post: Same subscales *Two items could be removed without altering the PES-NWI construct. The 2 items: "good working relationship with physicians" and "chief nurse equal in power and authority to other top-level executives" p. 336
Havens, Warshawsky, & Vasey (2012)	U.S. – Rural; *N* = 961; No Ethnicity/Race Description; Individual level Confirmatory Factor Analysis Pre: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse–Physician Relationships; 31 Items; 4-Point Scale Post: Same Subscales *One item was accidently deleted from the survey: "nursing diagnoses are used"

(continued)

Table 2 (continued)

Review of Literature: Practice Environment Scale – Nursing Work Index (PES-NWI) Factor (Subscale) Structures from U.S. and Asian Studies

Author/s	Location; Sample Size (N); Ethnicity/Race Description; Level of Response Type of Analysis Pre: PES-NWI Subscales; Number of Items; Response Choice Scale Size Post: PES-NWI Subscales after Analysis
Gajewski, Boyle, Miller, Oberhelman, & Dunton (2010)	U.S.; *N* (RN) = 72,889 and *N* (units) = 4,783; No Ethnicity/Race Description; Individual and unit level Multilevel Confirmatory Factor Analysis Pre: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse–Physician Relationships; 31 Items; 4-Point Scale Post: Same Subscales Exploratory Factor Analysis Pre: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse–Physician Relationships; 31 Items; 4-Point Scale Post: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; Nursing Professional Development *One item was deleted due to low factor loading value: "nursing diagnoses are used"
Liou & Cheng (2009)	U.S.; *N* = 230; California &Texas; *N* = 231, 37% Philippines, 16% Taiwan, 13% China, 13% Korea, 5% India, 4% Singapore, 4% Thailand, 4% Vietnam; Individual level Exploratory Factor Analysis/Common Factor Analysis Pre: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse–Physician Relationships; 31 Items; 5-Point Scale Post: Four factors identified (renaming one). Nurse Participation and Development; Nurse Manager Ability, Leadership, and Support; Nursing foundations for Quality of Care; and Collegial Nurse–Physician Relationships

(continued)

Table 2 (continued)

Review of Literature: Practice Environment Scale – Nursing Work Index (PES-NWI) Factor (Subscale) Structures from U.S. and Asian Studies

Author/s	Location; Sample Size (N); Ethnicity/Race Description; Level of Response Type of Analysis Pre: PES-NWI Subscales; Number of Items; Response Choice Scale Size Post: PES-NWI Subscales after Analysis
Chiang & Lin (2008)	Taiwan; *N* = 842; Individual level Exploratory Factor Analysis/ Principal Component Analysis Pre: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse–Physician Relationships; 31 Items; 4-Point Scale Post: Nurse Participation in Hospital Affairs; Nursing foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; Nursing Professional Development *One item was deleted due to low factor loading value: "nursing diagnoses are used"

Of the five studies found, four of the studies provided information regarding the PES-NWI items (see Table 3). Studies by Raju and colleagues (2014), Liou and Cheng (2009), and Chiang and Lin (2008) provided information regarding strength of item factor loading and what items loaded on the factors. Havens and colleagues (2012) reported on factor structure with very minimal item information. The study by Gajewski and colleagues (2010) focused more on the factor structure at the unit level using multilevel confirmatory factor analysis.

A common item, "nursing diagnoses are used", was noted to have weak factor loading and was deleted from the instrument (Chiang & Lin, 2008; Gajewski et al., 2010). Lai and colleagues (2013) report nursing diagnoses from the North American Nursing Diagnosis Association (NANDA) do not have much support by nurses in Taiwan. In addition, hospitals may use problem statements in conjunction with NANDA nursing diagnoses for care plan purposes (Varsi & Ruland, 2009).

Table 3

Review of Literature: Practice Environment Scale – Nursing Work Index (PES-NWI) Item Characteristic Information

Author/s	PES-NWI Items
Raju, Su, & Patrician (2014)	**Items providing the most information (highest discrimination) about the practice environment:** a. Administration that listens and responds to employee concerns. b. A clear philosophy of nursing that pervades the patient care environment. **Items providing the least information (lowest discrimination) about the practice environment:** a. Physicians and nurses have good working relationships. b. A chief nursing officer equal in power and authority to other top-level hospital executives. **Items with the highest missing response values:** a. An active quality assurance program. b. A preceptor program for newly hired RNs. **Item with the highest mean:** a. High standards of nursing care are expected by the administration. 3.4 **Item with the lowest mean:** a. Opportunity for staff nurses to participate in policy decisions. 2.4 **Items that did not help distinguish a good or poor environment:** a. A chief nursing officer equal in power and authority to other top-level hospital executives. b. A preceptor program for newly hired RNs. c. Physicians and nurses have good working relationships. d. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next. e. Enough registered nurses to provide quality patient care. f. Enough staff to get the work done. g. Written, up-to-date nursing care plans for all patients.
Gajewski, Boyle, Miller, Oberhelman, & Dunton (2010)	**Item with the highest mean (SD):** a. A preceptor program for newly hired RNs. 3.20 (.64) **Item with the lowest mean (SD):** a. Nursing administrators consult with staff on daily problems and procedures. 2.50 (.80)

(continued)

Table 3 (continued)

Review of Literature: Practice Environment Scale – Nursing Work Index (PES-NWI) Item Characteristic Information

Author/s	PES-NWI Items
Liou & Cheng (2009)	**Items cross-loaded and placed on different factor/s from Lake (2002):** *Nurse Manager Ability, Leadership, and Supportive Nurses:* a. A chief nursing officer equal in power and authority to other top-level hospital executives. b. Administration that listens and responds to employee concerns. c. Nursing administrators consult with staff on daily problems and procedures. d. An active quality assurance program.
Chiang & Lin (2008)****	**Item with the highest mean (SD):** a. Active staff development or continuing education programs for nurses. 3.21 (.52)** **Item with the lowest mean (SD):** a. Enough staff to get the work done. 2.06 (.76)** **Items placed in different factor/s from Lake (2002):** *Nursing Foundations for Quality of Care:* a. Physicians and nurses have good working relationships.** b. Enough registered nurses to provide quality patient care.** c. Collaboration (joint practice) between nurses and physicians.** *Nurse Manager Ability, Leadership, and Supportive Nurses:* a. A chief nursing officer which is highly visible and accessible to staff.** b. A chief nursing officer equal in power and authority to other top-level hospital executives.** c. Working with nurses who are clinically competent.** d. Administration that listens and responds to employee concerns.** e. Nursing administrators consult with staff on daily problems and procedures.** *Nursing professional Development (New/Renamed Factor):* a. Active staff development or continuing education programs for nurses.** b. Career development/clinical ladder opportunity.** c. A lot of teamwork between nurses and physicians.** d. Opportunities for advancement.** e. An active quality assurance program.** f. A preceptor program for newly hired RNs.** *Staffing and Resource Adequacy:* a. Physicians and nurses have good working relationships.**

Note. **The items in this section are the originally worded items from the PES-NWI (and not the translated version) to maintain consistency.

Schwartz's Theory of Basic Individual Values

Schwartz's (1992) work on the Theory of Basic Individual Values began prior to 1992 with the intent to identify values that diverse cultures share. Ten values were identified in his original published work. Schwartz and colleagues (2012) have expanded the theory to 19 values, including the original ten; they also integrated how values are influenced by motivation on a continuum. The purpose of values is to influence individuals: (a) in determining their path in meeting outcomes that may affect the self or a group; (b) in how they respond to change; and (c) in how they develop the self to enhance self-improvement or service to others (Schwartz et al., 2012).

Schwartz and colleagues (2012) also have made refinements to the values of interest in this study. Values within the two dimensions, openness to change and conservation, were changed. Within openness to change, self-direction includes freedom to think and act independently. The values, stimulation and hedonism have remained constant. Conservation, the second dimension, has largely been refined to add the values "face" (maintaining one's reputation and image) and "humility" (recognizing being a part of something larger, acceptance of being insignificant). Security includes both safety in one's environment and safety of the society. Conformity also has been refined to address following rules and meeting obligations, as well as avoiding upsetting or disappointing others. The value of tradition has remained constant from the original work to the current refined works. This theory is flexible and allows researchers to test large and small portions of the theory (Schwartz et al., 2012).

There have been several studies (Bardi & Schwartz, 2003; Davidov, Schmidt, & Schwartz, 2008; Hitlin, 2003; Knafo & Sagiv, 2004) guided by the theoretical works of Schwartz. However, few studies used the theoretical works and applied it to work place/job related research. Schwartz (1999) studied values and meaning of work from 49 nations and

found that majority of Asian countries tended to lean towards conservatism, while the U.S. and Japan leaned towards mastery (self-assertion). In a study by Devos and colleagues (2002), individuals that aligned themselves with the values under the dimension of conservation were more trusting of the organization for whom they worked; while those more aligned with the value, self-direction (openness to change dimension), were less trusting. Lyons and colleagues (2006) identified that individuals who choose to work in the public (i.e., government), parapublic (e.g. healthcare), and private settings were not influenced by their values.

Only one study (Liu, Borg, & Spector, 2004) that used previous work by Schwartz (1999) could be found in PubMed and the JStar database regarding measurement equivalence of an instrument. Liu and colleagues identified that a survey instrument had measurement equivalence when administered to participants that shared the same cultural values as identified by Schwartz (1999).

Individualism and Collectivism

The definitions of individualism and collectivism (Cukur, De Guzman, & Carlo, 2004; Hammamura, 2012; Schimmack, Oishi, & Diener, 2005) are found to be consistent with the Schwartz's Theory of Basic Values (Schwartz, 2012). It is associated with two dimensions, openness to change and conservation (Cong, Borg, & Spector, 2004; Devos, Spini, & Schwartz, 2002). A study by Cukor and colleagues support the works by Schwartz (1992). The researchers noted how values, religion, and individualism/collectivism parallel each other. Tradition was the most notable characteristic common to collectivism while values associated within the dimension openness to change were low. The value power was common in individualism, as well as the values associated with openness to change (hedonism and self-direction). According to the investigators, conservative values and lower achievement goals were associated with collectivism. In this study, individuals who self-reported (as Filipino reported) had a stronger

religious identification associated with collectivism. Also, Panda (2008) identified that China work values were consistent with collectivism characteristics.

Hammamura (2012) identified a shift in culture of individualism and collectivism. The investigator found that participants from Japan began to shift away from the importance of tradition and gravitated toward independent socialization and success. This appears to be consistent with Schwartz (1999) study of 49 countries. Japanese values were consistent with mastery (self-assertion). An increase in individualism also was reported by Schimmack and colleagues (2005). This may be the result of modernization of the work culture and economic growth. Of notable interest is that individuals still maintained a level of collectivism through strong identification with their cultural heritage.

A study by Schwartz and colleagues (2013) found that college students who were recent immigrants or first or second generation immigrants were found to adapt well in the U.S. and had an overall higher wellbeing when noted to have individualistic characteristics. However, those who were first or second generation immigrants had both individualist and collectivistic characteristics. This was attributed to having a bicultural identity.

Schimmack and colleagues (2005) report that individualism and collectivism lead to measurement issues often overlooked due to an emphasis on measurement across cultures. The authors recommend surveys have items that require reverse scoring to decrease preference responding, and that future research is necessary in measurement and psychometrics to address bias response to items.

Types of Item Response Styles

Acquiescence

Morren and colleagues (2011) express concerns that response styles may be overlooked due to the assumption that it will not affect measurement. Acquiescence occurs when there is

consistent agreement or disagreement with the item regardless of the content (Kam, Schermer, Harris, & Vernon, 2013) and may occur in surveys used across cultures. Kam and colleagues (2013) reported acquiescence may not necessarily be due to educational level, language proficiency, social economics, or aging. It may stem from cultural influences and when it occurs, it occurs consistently throughout the survey.

Kam and colleagues (2013) found that a response style such as acquiescence was imbedded in the explained variance. The researchers conducted a study to examine acquiescence bias and other response styles using a personality scale administered to participants. They were able to identify the distinct break down of the explained variance by using correlated trait-uncorrelated method within a multi trait-method confirmatory factor analysis. Their results demonstrated that residual variance, acquiescence bias, other response styles, and personality of the participants are embedded in the explanation of variance. This demonstrated the need to examine response styles for potential bias which may potentially inflate the explanation of the variance.

Acquiescence has been identified in survey results of participants of other cultures noted to have traits of collectivism rather than individualism (Chen, Shin-ying, & Stevenson, 1995; Johnson, Kulesa, Llc, Cho, & Shavitt, 2005; Grimm & Church, 1999; Smith, 2004; van Hemert, van de Vijver, Poortinga, & Georgas, 2002). It was noted that Asian cultures emphasized the collectivistic characteristic versus the western culture of individualism.

Extreme and Middle Response Styles

Individuals from U. S. (Chen, Lee, & Stevenson, 1995) were more apt to respond to survey items using the tail ends of the Likert-type scales; this is known as extreme response style. Extreme responses also tended to occur when the items are polarizing (Morren, Gelissen, & Vermunt, 2011). Harzing (2006) identified extreme response styles were more likely to occur

in instruments written in the original language and decreased when the instrument was translated into a second language. In addition, the anchors may not have linguistic equivalence thus hindering measurement that may occur when translating instruments to the Japanese language.

Chen and colleagues (1995) identified that individuals from the Asian culture tend to respond moderately (i.e., midpoint and not extreme; Chen, Lee, & Stevenson, 1995; Harzing, 2006; Zax & Takahashi, 1967). Individuals from Asian cultures may respond moderately to be identified as part of a group versus standing out. The investigators also found that Canadians were more likely to use the midpoint than Americans.

Researchers may opt to remove neutral points in their instrument to force participants to make a choice. A study by Mercer and Durham (2001) tested an instrument with and without a neutral response and found no statistical differences between the two scale type responses. However, the investigators made the assumption that the neutral points were selected due to ambiguity of the item content.

Summary

The five dimensions (subscales) of the PES-NWI by Lake (2002) were discussed. Five psychometric studies on the PES-NWI were evaluated, noting the factor structures, item loadings, and other item characteristics. Two race/ethnicity groups, White/Non-Hispanic and Asian/Pacific Islander, were examined. Further information was provided about Schwartz's Theory of Basic Values, studies using this model in work related studies, and how the two dimensions (i.e., openness to change and conservation) of the theory were related to individualism and collectivism. In addition, item response styles also were addressed and how individualism and collectivism may influence these styles.

Chapter III

Methods

Using data from the National Database of Nursing Quality Indicators™ (NDNQI®), I determined if the Practice Environment Scale-Nursing Work Index (PES-NWI) had measurement equivalence across two cultural groups. The two groups of interest were registered nurses reporting as White/Non-Hispanic or Asian/Pacific Islander. In chapter III, I describe the process of assessing measurement equivalence between two cultures using the PES-NWI. Additionally, the processes of examining item response, factor structure, and construct validity are explained.

Research Design

This study was a secondary analysis using existing data from 2013 of the NDNQI®. The NDNQI® administers the PES-NWI and collects information on registered nurses' (RN) characteristics. It was a descriptive design with evaluation of the PES-NWI psychometrics for the purpose of determining measurement equivalence in this instrument. It was a case-match study, using parameters of the RN characteristics. Participants self-reporting as White/Non-Hispanic were matched to participants self-reporting as Asian/Pacific Islander. By matching cases, systematic error may have been reduced along with confounding issues such as age, years of practice in the United States (U.S.), unit type, usual shift, and education which all may influence perception of the work environment. The intent was to balance these characteristics in this study and decrease the influence these characteristics may have on perception of the work environment.

Secondary Data Analysis

A secondary data analysis (SDA) was selected due to the NDNQI® administering the PES-NWI on a large scale, crossing many states (U.S.). This addressed recommendations by

Liou and Chen (2009) regarding having a larger sample size crossing more states in the U.S. In addition, conclusions may be more robust when using a dataset that has a large pool of cases (Castle, 2003; Schlomer & Copp, 2014). A large sample has its disadvantages however (Castle, 2003); all results may be statistically significant but may not be clinically or practically significant.

There were advantages to conducting an SDA (Castle, 2003). The benefits included the resourceful use of existing data and cost savings over collecting primary data. Furthermore, the time constraint of enrolling a new sample of participants was absent (Castle, 2003; Windle, 2010). SDA can be used for pilot studies in the process of developing hypotheses (Castle, 2003). In addition, secondary data are useful for descriptive, exploratory, or correlational studies; this form of data also is helpful in examining the reliability and validity of instruments (Windle, 2010). This research study did not require direct access to the participants to answer the research study's questions. One of the intentions of the NDNQI® project is to examine the nursing workforce practice environment by using the PES-NWI, which made these data a fit for this study.

A disadvantage of using secondary data is all desirable variables may not be in the dataset; the researcher is constrained to the variables in the dataset. Although this may lead to confounding issues, it can be minimized through various statistical analyses (Schlomer & Copp, 2014). Other known disadvantages of SDA are the inability to control the type of sample used and the research question from the primary study is usually different from the secondary study (Castle, 2003; Schlomer & Copp, 2014). Although my study purpose was different from the primary NDNQI® study aims, it actually provided further information about the PES-NWI instrument. It was recommended to maintain communication with the primary investigator

about the findings that may assist in clarification should questions arise when examining the data for the secondary analysis (Windle, 2010).

An SDA using data from the NDNQI® was suitable for answering the study questions (questions one and two contributed information to measurement equivalence):

1. Are there differing item response styles to the PES-NWI across the two groups, registered nurses reporting as White/Non-Hispanic (RNs-WNH) or Asian/Pacific Islander (RNs-API)?
2. Is there measurement equivalence of the PES-NWI between two groups—RNs-WNH and RNs-API?
3. Are there mean subscale score differences for the PES-NWI between RNs working in Magnet® hospitals versus non-magnet hospitals within in each group—RNs-WNH and RNs-API?

The data were analyzed following a similar process that Lake (2002) used in evaluating the reliability and validity of the PES-NWI.

NDNQI® Purpose

The NDNQI® is a repository of data of nursing sensitive information collected for the purpose of disseminating information related to nursing and patient outcomes and factors (structure, process, and outcomes) that affect quality patient care. The data are collected to represent information (e.g., PES-NWI, job enjoyment, patient falls) at the nursing unit level (nurses working in nursing units) which differs from other repositories that emphasize individual level data (Press Ganey Associates, 2014A). Indicators consist of characteristics, process, or outcomes that are affected by nurses and nursing units. Several indicators that are measured by the NDNQI® are endorsed by the National Quality Forum (NQF) including the PES-NWI. The NQF identifies measures (indicators) that provide information on patient-centered care with an

emphasis on (but not limited to) safety. Press Ganey Associates, Inc. has recently acquired the NDNQI® (Press Ganey Associates, 2014B). Over 2,000 hospitals participate in the NDNQI® (Press Ganey Associates, 2014C) but approximately 1,000 hospitals participate in the PES survey.

NDNQI® Data Collection Process

Data are collected from hospitals who are members of the NDNQI®. Prior to data collection, each hospital is required to identify a site coordinator who arranges the data collection and schedules the administration of surveys. The site coordinator selects one of three instruments to be administered annually (RN Survey with the Practice Environment Scale, RN Survey with Job Satisfaction Scales, or RN Survey with Job Satisfaction Scales-Short Form) and identifies a month of the year in which to release the survey to the registered nurses (RNs). There is a three week window that RNs may access the survey via on-line. The access is around the clock (24 hours a day, 7 days a week). The site coordinator notifies NDNQI® of the participating nursing units and number of nurses that will be involved in taking the survey. RNs must have a minimum of 3 months experience on their participating unit and spend 50% of their time in direct patient care to be eligible to take the surveys. Participants' responses are anonymous. No identifiers are collected and the survey cannot be saved by the participant and revisited for completion. Each individual nurse is emailed the directions and given a code to access the survey and submit responses.

Data Used for Secondary Analysis

The secondary data analysis was comprised of data collected by the NDNQI®, the RN Survey with Practice Environment Scale instrument. The instrument consists of the PES-NWI by Lake (2002) and items about RN characteristics, work context, and job enjoyment. Once the RN submits responses to the instrument an identification case number is assigned. The PES-NWI

focus is at the individual level and can be aggregated to a unit level. For the purpose of this study, data were evaluated at the individual level. The RN characteristics include demographics and other information such as years of RN practice and years of tenure on the nursing unit. The RN work context items refer to (but is not limited to) RN job plans, perception of the quality of care, and perception about job orientation, last shift worked, and hours worked. Variables of interest apart from the PES-NWI, are gender, race, RN age, RN role, shift rotation, unit type (adult critical care, adult step-down, adult medical, adult surgical, and adult medical-surgical), job status (Full Time/Part Time [FT/PT]), certification by a national nursing association, location of education (in/outside the U.S.), years worked on the current unit, years worked as an RN in U.S., years practiced outside U.S. equivalent to an RN, and RN job plans.

Sample Inclusion and Exclusion Criteria

Data used for this study were from 2013. The inclusion criteria for this study consisted of participants self-reporting a race and/or ethnicity of Asian/Pacific Islander or White/Non-Hispanic. The RN had to be 21 years of age or older. The focus was RNs working in acute care facilities. Individual level data (de-identified) for this secondary analysis were extracted from the NDNQI® database by the following steps:

1. Include RNs that responded to the PES-NWI and RN characteristic items.
2. Select RNs working in U.S. acute care facilities.
3. Select RNs that self-reported as White/Non-Hispanic or Asian/Pacific Islander.

In 2013, a total of 204,511 participants responded to the PES-NWI during the annual survey. Once the exclusion and criteria were used and prior to the case matching procedure, the sample remained large (n = 44,528). Case matching was conducted using SPSS v. 23 case-control matching option. Cases were matched using the following criteria: nursing unit type (critical care adults, step-down adult, medical adult, surgical adult, and medical-surgical adult

unit types), age, years of practice as a RN in the U.S., work shift, and education level. Exact matching on the variables was required and the matching was conducted randomly. A maximum allowed ratio of a 1:4 match for a maximum of four RNs-WNH cases to one RNs-API case (Wacholder, Silverman, McLaughlin, & Mandel, 1992) was allowed to ensure representation of RNs-WNH to the overall sample who completed the PES-NWI prior to the case matching procedure (Schlesselman & Stolley, 1982, p. 112). A comparison of the matched and non-matched cases was performed using t-tests and chi-square analyses to determine the representativeness of the matched cases sample.

Sample Size/Power Analysis

Adequate sample size is necessary for precise estimates of factor loadings during factor analysis. There are several recommendations for sample size to conduct factor analysis. MacCallum and colleagues (1999) reviewed different recommendations such as having a minimum of 100 participants or using a sample ranging from 100 to greater than 1000 participants, where 100 is poor and greater than 1,000 is excellent. Further recommendations also have been made regarding the number of items. For this study, a sample size greater than 500 was expected for each group (White/Non-Hispanic and Asian/Pacific Islander), which is recommended by MacCallum and colleagues (1999). This would not be difficult considering the number of hospitals (approximately 2000) that participate in the NDNQI® data collection.

For assessing the construct validity, an independent *t-test* was performed to examine mean differences in subscale scores between Magnet and non-Magnet groups within each group (White/Non-Hispanic and Asian/Pacific Islander). Using G*Power (Faul, Erdfelder, & Lang, 2007), a total of 51 participants were needed for each group to meet an $\alpha < .05$, $\beta = .80$, and a moderate effect size of .5. This was not an issue as the expected sample size for each group was expected to be greater than 500.

PES Subscales/Other Variables

The PES-NWI (Lake, 2002) was examined. The NDNQI® used the five subscales and 31 items (see Table 4). The five sub-scales were: (a) nurse participation in hospital affairs; (b) nursing foundation for quality of care; (c) nurse manager ability, leadership, and support for nurses; (d) staffing and resource adequacy; and (e) collegial nurse-physician relations. Nurse participation in hospital affairs focused on the nurses' role in the hospital, such as participating on committees, policy development, and governance. Nursing foundation for quality of care contained methods in which quality care was influenced by such things as a philosophy of nursing, quality assurance/improvement participation, competence, and staff education. Nurse manager ability, leadership, and support for nurses, examined the nurse manager's characteristics and how the individual supported the nurses and the unit. Staffing and resource adequacy contained items regarding how well the unit was staffed, and if enough staffing was present to allow nurses to spend time with their patients and address issues that arise. Collegial nurse-physician relations focused on the positive relationship between physicians and nurses. The stem was "For each item, please indicate the extent to which you agree that the item is PRESENT IN YOUR CURRENT JOB (NDNQI®, 2008)." The survey used a four point Likert-type scale (*1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree*). A mean was calculated for each subscale. Per each subscale, the lowest score was a "1" and the highest score was a "4". The higher the mean value for the subscale the more positive the perception was regarding the practice environment. A value of 2.5 was considered neutral or the midpoint of the scale (Lake, 2002).

To examine construct validity, mean differences within groups working in Magnet® versus non-magnet hospitals were analyzed. American Nurses Credentialing Center (ANCC) Magnet® hospital status is the highest recognition a hospital can obtain regarding nursing

excellence in practice and outcomes. Although the process of Magnet® designation and hospital identification started as early as 1983, Buchan (1999) reports that Magnet® status is still very relevant as it signifies quality in care while embracing efficiency that is important to labor markets. Hospitals (acute care facilities) report their Magnet® status through their site coordinator. The ANCC also provides a list of hospitals that have obtained or renewed their Magnet Status.

Table 4

Practice Environment Scale – Nursing Work Index (PES-NWI) Subscales and Corresponding Items as Administered by the NDNQI® (2008)

Subscale	Definition/Items
Nurse Participation in Hospital Affairs	"The participatory role and valued status of nurses in a broad hospital context." a. Career development/clinical ladder opportunity. b. Opportunity for staff nurses to participate in policy decisions. c. A chief nursing officer which is highly visible and accessible to staff. d. A chief nursing officer equal in power and authority to other top-level hospital executives. e. Opportunities for advancement. f. Administration that listens and responds to employee concerns. g. Staff nurses are involved in the internal governance of the hospital (e.g. practice and policy committees). h. Staff nurses have the opportunity to serve on hospital and nursing committees. i. Nursing administrators consult with staff on daily problems and procedures.

(continued)

Table 4 (continued)

Practice Environment Scale – Nursing Work Index (PES-NWI) Subscales and Corresponding Items as Administered by the NDNQI® (2008)

Subscale	Definition/Items
Nursing Foundations for Quality of Care	"The nursing foundations for a high standard of patient care: a pervasive nursing philosophy, a nursing (rather than a medical) model of care, and nurses a clinical competence and development." a. Active staff development or continuing education programs for nurses. b. High standards of nursing care are expected by the administration. c. A clear philosophy of nursing that pervades the patient care environment. d. Working with nurses who are clinically competent. e. An active quality assurance program. f. A preceptor program for newly hired RNs. g. Nursing care is based on a nursing, rather than a medical, model. h. Written, up-to-date nursing care plans for all patients. i. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next. j. Use of nursing diagnoses.
Nurse Manager Ability, Leadership, and Supportive Nurses	"The critical role and key qualities of the nurse manager and ways the nurse manager supports the nurse." a. A supervisory staff that is supportive of the nurses. b. Supervisors use mistakes as learning opportunities, not criticism. c. A nurse manager who was a good manager and leader. d. Praise and recognition for a job well done. e. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician.
Staffing and Resource Adequacy	"Having adequate staff and support resources to provide quality patient care." a. Adequate support services allow me to spend time with my patients. b. Enough time and opportunity to discuss patient care problems with other nurses. c. Enough registered nurses to provide quality patient care. d. Enough staff to get the work done.
Collegial Nurse Physician Relations	"The positive work relationships between nurses and physicians." a. Physicians and nurses have good working relationships. b. A lot of teamwork between nurses and physicians. c. Collaboration (joint practice) between nurses and physicians.

The practice environment is a crucial component when a hospital obtains Magnet status. The practice environment is expected to be better in Magnet®-designated hospitals (Stimpfel,

Rosen, & McHugh, 2014). Stubenrauch (2010), a representative from American Nursing Credentialing Center (ANCC), stated that non-magnet hospitals may have the same characteristics as Magnet® hospitals but do not have the recognition, as obtaining Magnet status is on a voluntary basis. The data collection regarding Magnet® status by the NDNQI consists of three categories. The categories consist of hospitals having Magnet® status (1), applying for Magnet® status (2), and non-magnet status (3). It is possible that hospitals in the process of applying for Magnet® status may not be allowed to report that they are applying for the status and are required to report a non-magnet status. This may be a study limitation. For this study, hospitals were coded as having Magnet® designation or not having Magnet® accreditation. Hospitals undergoing the application process were identified as non-magnet hospitals.

Reliability and Validity Assessment of the PES-NWI

Internal consistency reliability of the PES-NWI instrument has been strong historically. Chronbach's alpha (α) values for the overall composite score was adequate in the studies reviewed, but not necessarily for the all the subscales. Previous studies have shown acceptable Chronbach's α values ($\geq .70$) with the exception of the study by Chiang and Lin (2008, see Table 5). Of the studies reviewed in Chapter II, Lake (2002) was the only investigator providing construct validity of the PES-NWI; this did not include the NWI-R. The process of construct validity consisted of calculating means for each subscale. Thereafter, a total score mean was calculated using the five subscales. Lake (2002) then proceeded to evaluate for mean differences between Magnet and non-magnet groups. The mean scores were significantly ($p < .001$) higher in the Magnet® group. However, one limitation was noted to be a difference in group sizes (Magnet®, $n = 1{,}610$; and non-magnet, $n = 689$).

Table 5

Psychometric Properties of the Practice Environment Scale-Nursing Work Index (PES-NWI)

Author/s Overall *Chronbach's Alpha*	N	*Chronbach's Alpha*				
		Nurse Participation in Hospital Affairs	Nursing Foundations for Quality of Care	Nurse Manager Ability, Leadership, and Supportive Nurses	Staffing and Resource Adequacy	Collegial Nurse Physician Relations
Raju, Su, & Patrician (2014) = .94	888	> .80	> .80	> .80	> .80	> .80
Havens, Warshawsky, & Vasey (2012) = .93	961	≥ .80	.79	≥ .80	≥ .80	≥ .80
Liou & Cheng (2009) = .96	231	Subscale Change	.80	.92	.81	(1 Item)
Chiang & Lin(2008) = .90	842	.67	.65-.87	.65-.87	.65	Subscale Change
Lake (2002) = .82	1,610	.83	.80	.84	.80	.71

Data Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS v. 23) for descriptive statistics (question 1) and validity testing (question 3). In addition, measurement equivalence of the PES-NWI was analyzed using MPlus (v. 7.3). The extracted 2013 data for this study had already undergone a rigorous process of cleaning (examining errors, missing data, and duplicate responses) by NDNQI® personnel.

Research Question One

The first study question, "Are there differing item response styles to the PES-NWI across the two groups, registered nurses reporting as White/Non-Hispanic (RNs-WNH) or Asian/Pacific

Islander (RNs-API)?" was answered by the following process. Data ranges, distribution, means, medians, modes, standard deviations, bar charts, and missing data by groups were examined. Response styles also were examined. During the process of evaluating missing data, issues were explored, such as, one group being more likely not to respond to items or if there were certain items prone to have missing data. Cases from RNs-API with 100% missing data from the PES-NWI were deleted along with the matched RNs-WNH respondents if not a match to another case.

Research Question Two

The second study question, "Is there measurement equivalence of the PES-NWI between two groups—RNs-WNH and RNs-API?" was answered by using multiple group confirmatory factor analysis (CFA). CFA, rather than exploratory factor analysis, was used as the PES-NWI is a mature instrument with subscales already established. CFA tests the hypothesis that a pre-existing factoral structure holds in a different sample. CFA lends itself to factorial invariance testing which provides statistical determination of measurement equivalence of an instrument (Stommel, Wang, Given, & Given, 1992). The goal in assessing measurement equivalence of an instrument is to determine that instrument's structure is invariant across groups.

Conditions were implemented and evaluated in the process of determining measurement invariance using methods guided by Brown (2015), Little (2013), and Stommel, Wang, Given, and Given (1992). When evaluating invariance, Brown (2015) recommended conducting a CFA on each group independent of each other. Unlike exploratory factor analysis where the best factor structure is selected, the data were forced into the PES-NWI five subscales already established by Lake (2002). By forcing the factor structure, cross loading of indicator items were not permitted. Latent factors were allowed to be correlated. Thereafter, CFA was conducted using both groups simultaneously. Evaluation consisted of examining the factor loadings and indicator intercepts for equality across the combined White/Non-Hispanic and Asian/Pacific

Islander group. The final evaluation consisted of examining the fit indices and changes from one model to a more constrained model.

Statistical indicators were used to help determine fit of the established model. The Chi-square test was used to determine differences between variance/covariance matrix of the observed sample and the hypothesized model. Should the Chi-square test be statistically significant ($p < .05$), it would imply there was a difference, whereas the desire would be no difference. In this study, the chi-square was anticipated to be statistically significant due to the test being sensitive to a large sample size; hence other indices were necessary to evaluate. Indices such as root mean square error of approximation (*RMSEA*), Comparative Fit Index (*CFI*), Tucker-Lewis Index (*TLI*), and standardized root mean square residual (*SRMR*) were examined. Fit indices were examined to determine type of model fit (strong, adequate, weak) and if invariance existed.

Research Question Three

Validity. The third study question, "Are there mean subscale score differences for the PES-NWI between RNs working in Magnet® hospitals versus non-magnet hospitals within in each group—RNs-WNH and RNs-API?" was answered by the following process. Construct validity assessment was conducted by using the contrasting groups approach (Waltz et al., 2005, p. 156-157). Within each group, an independent *t-test* was conducted to determine mean differences of PES-NWI subscales between RNs working in Magnet® designated hospitals and nurses working in non-magnet designated hospitals. This was a similar process that Lake (2002) used except tested at the individual level.

Human Subjects Protection

A Midwestern academic medical center institutional review board (IRB) had approved NDNQI® to administer the PES-NWI to participating hospitals. Consent for data use was

obtained according to NDNQI® processes. A confidentiality agreement was signed by the researcher for this study to access the NDNQI® data needed for the secondary analysis. An application for non-human subject determination was sought from the Midwestern academic medical center Human Subjects Committee and this study was approved.

Nurses participating in the NDNQI® surveys do so voluntarily and no identifiers (e.g., name, date of birth, hospital) were reported by the participant. The secondary dataset did not contain hospital identifiers nor were the case numbers provided. The purpose of this study (reliability/validity of the PES-NWI) was within the overall purpose of NDNQI®. This was a secondary data analysis and a separate consent was not obtained from the participants. The investigator completed all institutional compliance training; and permission for publication of the study results will be obtained from the NDNQI® prior to dissemination.

Data Protection

De-identified data and any other electronic files related to this study were maintained on a password protected hard drive. Data for this study did not contain any identifiers. When data and/or statistical analysis output needed to be emailed to the NDNQI research team and or dissertation committee chairperson, it was through the secured/encrypted email provided by the Midwestern academic medical center. All printed data was kept in a locked file. Data, records, hardcopy results will be kept for seven years at the NDNQI, following institutional policy. Thereafter, electronic files/data will be deleted and any hardcopies will be destroyed. The IRB will be notified should any breach in confidentiality or violation in privacy occur.

Summary

In Chapter III, the methodology of the study was described. The reliability and the validity of the PES-NWI undertaken by Lake (2002) were examined. Previous reliability measurements were provided from differing published studies. Plans for sample size

(considering alpha value and power), factor analysis, reliability, and validity were discussed. Human subjects and data protection also was addressed in this chapter.

Chapter IV

Results

There are four sections in this chapter. The first section of the chapter consists of sample descriptions across groups, registered nurses reporting as Asian/Pacific Islander (RNs-API) and registered nurses reporting as White/Non-Hispanic (RNs-WNH). The descriptive statistics for the Practice Environment Scale – Nursing Work Index (PES-NWI) items across groups are provided and discussed in the second section. The third section of this chapter consists of results from testing the PES-NWI theoretical structure using confirmatory factor analysis (CFA) by individual groups (RNs-API and RNs-WNH). Thereafter, testing for measurement invariance using multiple groups CFA was undertaken. Three models' results are presented: configural (equal form), weak invariance (metric), and strong invariance (scalar). The final section consists of the validity results of the PES-NWI that followed the process Lake (2002) took when examining the psychometrics of the instrument, however tested at the individual level. Data analysis for this study was guided by the research questions:

1. Are there differing item response styles to the PES-NWI across the two groups—RNs-WNH and RNs-API?
2. Is there measurement equivalence of the PES-NWI between two groups—RNs-WNH and RNs-API?
3. Are there mean subscale score differences for the PES-NWI between RNs working in Magnet® hospitals versus non-magnet hospitals within in each group—RNs-WNH and RNs-API?

Sample Description

This study had 14,258 participants. The majority of the participants reported as RNs-WNH (*n* = 10,452, 73.3%). Participants reporting as RNs-API were 26.7% (*n* = 3,806) of the overall

total sample. Participants reporting as RNs-API had an average age of 35.8 years (*SD* = 9.3), practiced as a RN in the U.S. on average of 8.2 (*SD* = 7.5) years, worked an average of 4.9 (*SD* = 5.1) years on their current nursing unit, and when combining years in total (years working in the US and years working outside U.S. equivalent to an RN) worked an average of 9.9 (*SD* = 8.8) years (see Table 6.). When compared to RNs reporting as RNs-WNH, RNs-API tended to be older and have more years of experience practicing on the current unit in the U.S., and in total (years working in the U.S. and years working outside U.S. equivalent to an RN). There were statistically significant differences in means (age and years of practice) between groups via independent *t-test* ($p < .001$; see Table 6). All independent t-test results had less than small to small effect sizes when evaluating *Cohen's d* results (.132 to .387; see Table 6). A larger proportion ($\chi^2 = 110.238$; $p < .001$) of RNs-API reported as male (16%) when compared to RNs-WNH (9.7%; *Cramer's V* = .088; see Table 7).

Table 6

Independent t-test Results of Individual Characteristics of Nurses Between Groups

	RNs-API (3,806)	RNs-WNH (10,452)		
Characteristics	*M (SD)*	*M (SD)*	*t*	*D*
Age	35.84 (9.31)	33.40 (8.4)	14.22*	.275
Years Practicing in US	8.21 (7.54)	6.84 (6.69)	9.85*	.192
Years on Current Unit	4.96 (5.12)	4.31 (4.7)	6.92*	.132
Years Practicing in US + Years Practicing Before US	9.92 (8.86)	6.87 (6.73)	19.27*	.387

Note. * $p < .001$; API = Asian/Pacific Islander; WNH = White/Non-Hispanic; *d* = Cohen's D

Table 7

Description of Characteristics by Group

Characteristics	*Chi-Square*	*DF*	*p*	V	Percent	
					RNs-API (*n*=3,806)	RNs-WNH (*n*=10,452)
Gender:	110.238	1	< .001[t]	.088		
Male					16.0*	9.7*
Female					84.0*	90.3*
Unit Types:	14.924	4	.005	.032		
Critical Care Adult					30.0*	33.0*
Step-Down Adult					18.2	17.7
Medical Adult					17.2	16.3
Surgical Adult					10.6*	9.3*
Medical-Surgical Adult					24.0	23.7
Usual Shift:	19.459	3	< .001	.037		
Day					52.0*	54.9*
Evening					2.3*	1.5*
Night					44.0*	42.1*
No Usual Shift					1.7	1.5
Usual Shift Rotation:	25.917	4	< .001	.043		
No Rotation					89.2	88.5
Day-Evening					2.9*	4.2*
Day-Night					5.2	5.4
Day-Evening-Night					.7	.9
Evening-Night					1.9*	1.1*
Highest Level Education:	50.569	3	< .001	.060		
Diploma					1.0*	.4*
Associate					21.3*	19.1*
Baccalaureate					76.1*	79.7*
Master's					1.7*	.7*
Location of Basic RN Education:	3775.994	1	< .001[t]	.515		
In the US					64.3*	99.3*
Outside the US					35.7*	.7*
Highest Nursing License:	1.167	1	.288[t]	.009		
RN					99.7	99.8
APRN					.3	.2
Hold Specialty Certification:	29.401	1	< .001[t]	.046		
Yes					21.4*	17.4*
No					78.6*	82.6*

(continued)

Table 7 (continued)

Description of Characteristics by Group

Characteristics	*Chi-Square*	*DF*	*p*		Percent	
					RNs-API (*n*=3.806)	RNs-WNH (*n*=10,452)
Job Status:	18.513	2	< .001	.036		
Regular Full-time					85.9*	83.0*
Regular Part-time					10.5*	13.1*
PRN					3.6*	3.8*
Job Plans Next Year:	97.803	5	< .001	.083		
Stay in Current Position					77.2*	71.4*
Direct Care, New Unit, Same Hospital					10.7	11.8
Direct care, Outside Hospital					5.8*	10.8*
Leave Direct Care, Stay in Nursing					5.2	5.4
Leave Nursing					.6	.5
Retire					.4*	.2*
Hospital Bedsize:	139.842	5	< .001	.099		
≤ 100					2.6*	4.3*
100-199					13.7*	15.4*
200-299					27.8*	22.2*
300-399					14.3*	20.4*
400-499					20.6*	16.8*
≥ 500					21	21
Hospital Ownership:	28.188	3	< .001	.044		
Nor For Profit					87.6	88.3
Government/Federal					1.4*	.5*
Government/Non-Federal					7.7	7.8
For Profit Investor Owned					3.4	3.4
Hospital Teaching Status:	101.149	2	< .001	.084		
Academic Medical Center					26.1*	20.9*
Teaching Hospital					33.8*	42.8*
Non-Teaching Hospital					40.1*	36.3*

(continued)

Table 7 (continued)

Description of Characteristics by Group

Characteristics	*Chi-Square*	*DF*	*p*		Percent RNs-API (*n*=3.806)	Percent RNs-WNH (*n*=10,452)
Designated Magnet® Status:	6.415	1	.011[t]	.021		
Non-Magnet					55.7*	58.0*
Magnet®					44.3*	42.0*

Note. t = Fisher's Exact Test. * = statistical difference at α = .05 level; API = Asian/Pacific Islander; WNH = White/Non-Hispanic; V = Cramer's V

Work Characteristics of Nurses

In this study, there were 2,902 nursing units which consisted of critical care adults, step-down adult, medical adult, surgical adult, and medical-surgical adult unit types (24.6%, 17.6%, 19.4%, 12.9%, and 25.6% respectively). In determining if differences in proportions exists between RNs-API and RNs-WNH characteristics, the *chi-square* test was used (see Table 7). Effect sizes were evaluated using Cramer's V. All Cramer's V results were < .1 with the exception of the descriptive variable, location of basic RN education (V = .515, see Table 7). Although a larger portion of RNs in both groups work in critical care adult units, the proportion of RNs-API was statistically, significantly smaller than RNs-WNH. The proportion of RNs-API was larger than RNs-WNH working in surgical adult units.

The majority of registered nurses worked day shift. A smaller proportion of RNs-API worked day shift and a larger portion worked evening and night shift than RNs-WNH. The majority of all nurses did not have rotating shifts. If having to work rotating shifts, a larger portion of RNs-WNH worked day-evening rotating shifts than RNs-API, however, a larger portion of RNs-API worked evening-night shift rotations than RNs-WNH.

Most RNs worked in full-time positions, but a larger proportion of RNs-WNH worked part-time and PRN (as needed) positions when compared to RNs-API. Additionally, a larger portion of RNs-API worked in full-time positions in comparison to RNs-WNH.

The majority of all RNs in both groups were planning to stay in their current positions for the next year. Of interest, a larger portion of RNs-API reported the plan to stay in their current job when compared to RNs-WNH. In addition, a larger percentage of RNs-API were more likely to plan to retire in the next year than RNs-WNH and a larger portion of RNs-WNH were more likely to plan to leave their current position to do direct care outside of the hospital than RNs-API.

Description of Registered Nurses' Education

The most frequently reported highest degree was baccalaureate (see Table 7). A larger portion of RNs-API reported highest education level as diploma (1%), associate (21.3%), and master's (1.7%) when compared to RN-WNH (0.4%, 19.1%, and 0.7% respectively). There was no statistical difference in the proportions of RNs between groups reporting their highest level of nursing license. Of interest, a larger proportion of RNs-API (21.4%) reported having a specialty nursing certification when compared to RNs-WNH (17.4%). As expected, there was a greater proportion of RNs-API (35.7%) who obtained their basic RN education outside of the U.S. than RNs-WNH (0.7%).

A larger proportion of RNs-API (n = 1,357) reported their basic RN education was obtained outside of U.S. when compared to RNs-WNH (n = 73). Of those RNs-API who reported receiving their basic RN education outside U.S. reported receiving it in the most frequently cited countries were the Philippines (71%) and India (21%; see Table 8). There were missing data from RNs-API regarding this item (1.5%). Of those RNs-WNH who reported receiving their basic education outside of the U.S. the most frequently cited country was Canada

(35.3%). Of the RNs-WNH who reported receiving their basic RN education outside of the US, 6.8% did not identify the country in which the education was obtained.

Table 8

List of Countries, Outside the U.S., Where Registered Nurses Reported Receiving Their Basic RN Education

	Percent (n)	
Country	RNs-API (*n* = 1,336)	RNs-WNH (*n* = 68)
Australia	< 1.0% (2)	
Belgium		1.5% (1)
Belarus		1.5% (1)
Bermuda	< 1.0% (1)	
Canada	1.1% (15)	35.3% (24)
China	1.2% (16)	
Egypt		1.5% (1)
Georgia		1.5% (1)
Germany	< 1% (1)	2.9% (2)
India	21.0% (280)	1.5% (1)
Iran		4.4% (3)
Jamaica	< 1.0% (1)	
Japan	< 1.0% (5)	
Jordan		1.5% (1)
Kazakhstan		1.5% (1)
Korea, Democratic People's Republic of	< 1% (2)	
Korea, Republic of	1.9% (26)	
Lebanon		2.9% (2)
Lithuania		4.4% (3)
Mexico	< 1.0% (1)	
Nepal	< 1.0% (6)	
Netherlands		1.5% (1)
New Zealand		2.9% (2)
Pakistan	< 1.0% (5)	
Peru	< 1.0% (2)	
Philippines	71% (949)	2.9% (2)
Pitcaim	< 1.0% (1)	
Poland		7.4% (5)
Romania		1.5% (1)
Russian Federation		2.9% (2)
Singapore	< 1% (2)	
South Africa	< 1.0% (1)	1.5% (1)
Spain		1.5% (1)

(continued)

Table 8 (continued)

List of Countries, Outside the U.S., Where Registered Nurses Reported Receiving Their Basic RN Education

	Percent (n)	
Country	RNs-API (*n* = 1,336)	RNs-WNH (*n* = 68)
Taiwan, Province of China	< 1.0% (11)	
Thailand	< 1.0% (6)	
Ukraine		5.9% (4)
United Kingdom of Great Britain and Northern Ireland	< 1.0% (2)	7.4% (5)
US Minor Outlying Islands		1.5% (1)
Uzbekistan		2.9% (2)
Vietnam	< 1.0% (1)	

Note. Shaded areas = 0.0%;

Description of Hospital Characteristics

In this study, there were 454 hospitals, 72.7% (*n* = 330) were non-magnet status and 27.3% (*n* = 124) were Magnet® designated. Participants in this study were more likely to work in a hospital with a bedsize of 200-299 and non-magnet designated hospitals (see Table 7). There was a larger percentage of RNs-API working in hospitals with bedsizes of 200-299 (27.8%) and 400-499 (20.6%) when compared to RNs-WNH (22.2%,16.8%, respectively). A larger portion of RNs-API worked in academic medical centers (26.1%) and non-teaching hospitals (40.1%) when compared to RNs-WNH (20.9%, 36.3% respectively). A larger proportion of RNs-WNH (42.8%) worked in teaching hospitals than RNs-API (33.8%). The proportions of both groups were similar for profit hospitals, government/non-federal hospitals, and for-profit investor owned hospitals. However, there were proportional differences between groups working at government/federal hospitals (RNs-API, 1.4% and RNs-WNH, 0.5%). A larger proportion of RNs-WNH worked in non-Magnet designated hospitals when compared to RNs-API, while a larger proportion of RNs-API worked in Magnet® designated hospitals when compared to RNs-WNH.

Comparison of Matched and Non-Matched Cases

To determine if there were differences between those cases who were not matched to those who were matched, the following variables were examined: place of education (within U.S. vs. outside U.S.), age, total years of practice, unit type, work shift, and education level. The majority of all characteristics were found to be statistically significantly different, however, the only characteristic found to have a moderate effect size for the case match group (*n* = 14,258) was the location of where the RNs obtained their basic nursing education (within U.S. vs. outside U.S.). When determining if the case match group represented the group not used (non-case match group), Cohen's D and Cramer's V were examined (see Table 9). The mean age of the non-case matched RNs-API (43.2, SD = 9.3) was higher than the case matched RNs-API mean age (35.84, SD = 9.3; see Table 10). The mean total years of practice of the non-case matched RNs-API (16.1, SD = 9.4) was higher than the case matched RNs-API mean total years of practice (9.9, SD = 8.8). When evaluating these two characteristics in the non-case matched group by race/ethnicity, the RNs-API group was older and had more total years of practice than the RNs-WNH group. The other variables used for matching were also examined for differences in case matched and non-cased matched groups (see Tables 9, 10, and 11). The magnitude of mean differences and proportions were small to negligible between groups with the exception of age. The RNs-API case match versus non-case match group were younger, effect size was moderate to large. Overall there were minimal differences between the groups (case match vs. non-case match groups [RNs-WNH and RNs-API]).

Table 9

Effect Sizes of Comparisons of Case Match (n = 14,258) and Non-Case Match (n = 30,270) Groups for RNs-API and RNs-WNH

Characteristics	Case Match (RNs-API and RNs-WNH)	Non-Case Match (RNs-API and RNs-WNH)	Case Match RNs-API vs. Non-case Match RNs-API	Case Match RNs-WNH vs. Non-case Match RNs-WNH
	Cohen's D			
Age	.275	.442	.791*	.483
Years Practicing in US	.192	.243	.497	.345
Years on Current Unit	.132	.242	.397	.233
Years Practicing in US + Years Practicing Before US	.387	.624*	.667*	.346
	Cramer's V			
Gender	.088	.031	.051	.001
Unit Types	.032	.076	.124	.062
Usual Shift	.037	.192	.221	.142
Usual Shift Rotation	.043	.086	.060	.051
Highest Level Education	.060	.210	.258	.301
Location of Basic RN Education	.515*	.727*	.276	.014
Highest Nursing License	.009	.032	.059	.024
Hold Specialty Certification	.046	.059	.034	.001
Job Status	.036	.040	.017	.030
Job Plans Next Year	.083	.061	.067	.055
Hospital Bedsize	.099	.065	.042	.035
Hospital Ownership	.044	.053	.022	.012
Hospital Teaching Status	.084	.080	.028	.035
Designated Magnet® Status	.021	.033	.007	.018

Note. * = Midsize effect or larger; API = Asian/Pacific Islander; WNH = White/Non-Hispanic; Case match RNs-API (*n* = 3,806); Case match RNs-WNH (*n* = 10,452); Non-case match RNs-API (*n* = 3,716); Non-case match RNs-WNH (*n* = 26,554).

Table 10

Independent t-test Results of Case Matched Variables for Case Matched and Non-case Matched Groups

	Case Matched RNs-API (n=3,806)	Non-case Matched RNs-API (n=3,716)		
Characteristics	*M (SD)*	*M (SD)*	*t*	*d*
Age	35.84 (9.31)	43.24 (9.38)	34.283*	.791
Years Practicing in US	8.21 (7.54)	12.15 (8.29)	21.549*	.497
	Case Matched RNs-WNH (n=10,452)	Non-case Matched RNs-WNH (n=26,554)		
Characteristics	*M (SD)*	*M (SD)*	*t*	*d*
Age	33.40 (8.40)	38.44 (12.13)	45.509*	.483
Years Practicing in US	6.84 (6.69)	9.86 (10.39)	33.044*	.345
	Non-case Matched RNs-API (n=3,716)	Non-case Matched RNs-WNH (n=26,554)		
Characteristics	*M (SD)*	*M (SD)*	*t*	*d*
Age	43.24 (9.38)	38.44 (12.13)	-28.032*	.442
Years Practicing in US	12.15 (8.29)	9.86 (10.39)	-15.226*	.243

Note. * $p < .001$; API = Asian/Pacific Islander; WNH = White/Non-Hispanic; *d* = Cohen's D

Table 11

Comparison of Characteristics(Case Matched Variables) for Case Matched and Non-case Matched Groups

Characteristics	*Chi-Square*	*DF*	*P*	V	Percent	
					Case Matched RNs-API (*n*=3,806)	Non-case Matched RNs-API (*n*=3,716)
Unit Types:	115.659	4	< .001	.124		
Critical Care Adult					30.0*	19.5*
Step-Down Adult					18.2*	20.5*
Medical Adult					17.2*	19.5*
Surgical Adult					10.6*	13.9*
Medical-Surgical Adult					24.0*	26.7*
Usual Shift:	368.146	3	< .001	.221		
Day					52.0*	31.8*
Evening					2.3*	7.5*
Night					44.0*	58.5*
No Usual Shift					1.7	2.2
Highest Level Education:	499.071	4	< .001	.258		
Diploma					1.0*	9.3*
Associate					21.3*	12.5*
Baccalaureate					76.1*	70.5*
Master's					1.7*	7.3*

Characteristics	*Chi-Square*	*DF*	*P*	V	Percent	
					Case Matched RNs-WNH (*n*=10,452)	Non-case Matched RNs-WNH (*n*=26,554)
Unit Types:	143.343	4	< .001	.062		
Critical Care Adult					33.0*	29.6*
Step-Down Adult					17.7	18.0
Medical Adult					16.3	17.1
Surgical Adult					9.3*	13.3*
Medical-Surgical Adult					23.7*	22.0*

(continued)

Table 11 (continued)

Comparison of Characteristics(Case Matched Variables) for Case Matched and Non-case Matched Groups

Characteristics	*Chi-Square*	*DF*	*P*	V	Percent	
					Case Matched RNs-WNH (*n*=10,452)	Non-case Matched RNs-WNH (*n*=26,554)
Usual Shift:	749.053	3	< .001	.142		
Day					54.9	56.8
Evening					1.5	5.2
Night					42.1	32.3
No Usual Shift					1.5	5.6
Highest Level Education:	3343.852	4	< .001	.301		
Diploma					0.4*	5.8*
Associate					19.1*	43.3*
Baccalaureate					79.7*	47.2*
Master's					0.7*	3.5*

Characteristics	*Chi-Square*	*DF*	*P*	V	Percent	
					Non-case Matched RNs-API (*n*=3,716)	Non-case Matched RNs-WNH (*n*=26,554)
Unit Types:	172.846	4	< .001	.076		
Critical Care Adult					19.5*	29.6*
Step-Down Adult					20.5*	18.0*
Medical Adult					19.5*	17.1*
Surgical Adult					13.9	13.3
Medical-Surgical Adult					26.7*	22.0*
Usual Shift:	1114.734	3	< .001	.192		
Day					31.8*	56.8*
Evening					7.5*	5.2*
Night					58.5*	32.3*
No Usual Shift					2.2*	5.6*
Highest Level Education:	1339.262	4	< .001	.032		
Diploma					9.3*	5.8*
Associate					12.5*	43.3*
Baccalaureate					70.5*	47.2*
Master's					7.3*	3.5*

Note. * = statistical difference at α = .05 level; API = Asian/Pacific Islander; WNH = White/Non-Hispanic; V = Cramer's V

Descriptive Statistics for Items of the PES-NWI (Research Question 1)

The majority of all items were responded to by the participants (see Tables 12 and 13). Less than 1% of RNs-API and RNs-WNH did not respond to items. Item HA4 had the highest percentage of missing data for RNs-API (.6%) and RNs-NHW (.98%). Interestingly, the indicator, "*Physicians and nurses have good working relationships*" had a 100% response rate in the RNs-API group. For each item, the entire response range (1-4) was used. The response, "agree (3)" was selected the most (mode). A lower percentage of RNs-API used the responses "strongly disagree (1)" and "disagree (2)" when compared to RNs-WNH (see Figure 3). For all items, the median value (3) was the same as the mode value (3). The responses to the PES-NWI were treated as interval. Per group, there were a greater number of items that had mean values greater than 3.0, however, RNs-API tended to have more items that had mean values greater than 3.0 when compared to RNs-WNH. Due to having a large sample size, the mean value was the best value to depict central tendency. All standard deviations were less than one. All items had a negative skew. The majority of participants tended to select the positive responses, "agree (3)" and "strongly agree (4)".

Table 12

Descriptive Statistics of the Practice Environment Scale=Nursing Work Index (PES-NWI) by RNs-API (n = 3,806)

Indicators	*n*	Missing *n* (%)	*M (SD)*	Strongly Disagree *%*	Disagree *%*	Agree *%*	Strongly Agree *%*
SR1 adequate support services	3805	1 (.02)	2.87 (.754)	5.0	21.0	56.4	17.6
SR2 time to discuss patients	3799	7 (.18)	2.91 (.688)	3.0	19.3	61.0	16.7
SR3 enough RNs to provide quality care	3798	8 (.21)	2.76 (.818)	7.9	24.4	51.2	16.6
SR4 enough staff to get job done	3797	9 (.23)	2.65 (.797)	8.2	30.4	49.1	12.2
HA1 career development – clinical ladder	3801	5 (.13)	3.09 (.696)	2.9	11.5	59.5	26.1
HA2 opportunity to participate in policy	3792	14 (.36)	2.9 (.729)	4.4	19.0	58.9	17.7
HA3 CNO visible and accessible	3790	16 (.42)	2.76 (.806)	7.3	25.3	51.4	16.0
HA4 CNO equal in power and authority	3783	23 (.60)	3.05 (.629)	2.4	10.0	67.5	20.0
HA5 opportunities for advancement	3796	10 (.26)	3.02 (.688)	3.1	13.7	61.8	21.4
HA6 administration listens and responds	3792	14 (.36)	2.83 (.772)	6.4	20.4	56.8	16.5
HA7 RNs involved in governance of hospital	3787	19 (.50)	3.03 (.666)	2.7	12.4	63.7	21.2
HA8 RNs serve on committees	3797	9 (.23)	3.24 (.566)	0.8	4.3	64.6	30.3
HA9 administrators consult with staff	3789	17 (.44)	2.86 (.757)	5.3	20.7	56.6	17.4
QC1 staff development for nurses	3800	6 (.15)	3.19 (.659)	1.9	8.4	58.7	31.0
QC2 high standards are expected	3793	13 (.34)	3.4 (.56)	0.7	1.7	54.4	43.3
QC3 clear philosophy of nursing	3784	22 (.58)	3.13 (.59)	1.5	7.1	68.1	23.2
QC4 nurses who are clinically competent	3795	11 (.28)	3.25 (.576)	0.7	5.0	63.0	31.3
QC5 active quality assurance program	3787	19 (.50)	3.09 (.575)	1.4	8.3	70.5	19.7
QC6 preceptor program	3793	13 (.34)	3.36 (.603)	1.2	3.2	54.3	41.3
QC7 nursing, not medical model	3794	12 (.31)	3.13 (.621)	1.7	8.5	64.9	24.9
QC8 up-to-date care plans	3794	12 (.31)	3.15 (.588)	1.2	7.4	66.7	24.7
QC9 patient assignments foster continuity	3801	5 (.13)	3.14 (.646)	2.3	7.8	63.2	26.7
QC10 use of nursing diagnoses	3797	9 (.23)	3.12 (.597)	1.3	8.6	66.9	23.2
NM1 supervisors supportive	3801	5 (.13)	3.1 (.714)	3.4	10.7	58.1	27.9
NM2 mistakes as learning opportunities	3796	10 (.26)	3.02 (.721)	4.2	12.2	60.7	22.8
NM3 nurse manager good manager	3793	13 (.34)	3.2 (.756)	4.1	8.4	51.4	36.1
NM4 praise and recognition	3797	9 (.23)	2.93 (.743)	4.4	17.9	57.6	20.1
NM5 manager backs up staff	3795	11 (.28)	3.13 (.747)	4.1	10.2	54.8	31.0
NP1 MD RN good relationships	3806	0 (0)	3.12 (.579)	1.2	7.8	68.6	22.3
NP2 lot of team work	3798	8 (.21)	3.03 (.648)	1.7	14.3	62.9	21.0
NP3 RN MD collaboration	3792	14 (.36)	3.05 (.596)	1.3	11.4	68.3	18.9

Note. API = Asian/Pacific Islander; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Table 13

Descriptive Statistics of the Practice Environment Scale-Nursing Work Index (PES-NWI) by RNs-WNH (n = 10,452)

Indicators	*n*	Missing *n* %	*M (SD)*	Strongly Disagree %	Disagree %	Agree %	Strongly Agree %
SR1 adequate support services	10447	5 (.04)	2.67 (.778)	7.6	29.3	51.4	11.7
SR2 time to discuss patients	10440	12 (.11)	2.88 (.697)	3.5	20.6	60.5	15.3
SR3 enough RNs to provide quality care	10441	11 (.10)	2.61 (.852)	11.3	29.6	46.0	13.1
SR4 enough staff to get job done	10425	27 (.25)	2.51 (.824)	11.7	35.4	43.2	9.7
HA1 career development – clinical ladder	10435	17 (.16)	2.99 (.728)	3.5	16.1	57.6	22.7
HA2 opportunity to participate in policy	10436	16 (.15)	2.77 (.781)	6.7	24.5	53.9	14.9
HA3 CNO visible and accessible	10421	31 (.29)	2.59 (.867)	12.1	29.9	44.6	13.5
HA4 CNO equal in power and authority	10350	102 (.98)	2.96 (.693)	4.0	14.1	63.9	18.1
HA5 opportunities for advancement	10430	22 (.21)	2.85 (.714)	4.1	21.8	59.1	15.0
HA6 administration listens and responds	10420	32 (.30)	2.67 (.839)	10.4	25.9	50.0	13.7
HA7 RNs involved in governance of hospital	10424	28 (.26)	3 (.703)	3.7	13.8	61.6	20.8
HA8 RNs serve on committees	10421	31 (.29)	3.27 (.573)	0.8	4.0	62.2	33.0
HA9 administrators consult with staff	10428	24 (.23)	2.7 (.815)	8.4	27.4	49.8	14.4
QC1 staff development for nurses	10440	12 (.11)	3.09 (.694)	2.8	11.4	59.5	26.3
QC2 high standards are expected	10422	30 (.28)	3.39 (.594)	1.1	2.6	52.9	43.5
QC3 clear philosophy of nursing	10411	41 (.39)	3.04 (.635)	2.3	11.5	66.4	19.8
QC4 nurses who are clinically competent	10439	13 (.12)	3.26 (.598)	1.1	4.8	61.0	33.1
QC5 active quality assurance program	10403	49 (.47)	3.03 (.593)	2.0	9.9	70.8	17.2
QC6 preceptor program	10436	16 (.15)	3.33 (.62)	1.4	4.0	54.5	40.1
QC7 nursing, not medical model	10413	39 (.37)	3.03 (.674)	2.6	13.7	62.1	21.6
QC8 up-to-date care plans	10429	23 (.22)	3.01 (.649)	2.3	13.7	64.7	19.3
QC9 patient assignments foster continuity	10441	11 (.10)	3.07 (.688)	3.2	10.6	61.7	24.4
QC10 use of nursing diagnoses	10429	23 (.22)	2.89 (.678)	3.4	18.7	63.1	14.7
NM1 supervisors supportive	10446	6 (.05)	3.03 (.773)	4.7	14.4	54.5	26.4
NM2 mistakes as learning opportunities	10436	16 (.15)	2.96 (.765)	5.4	14.8	57.6	22.1
NM3 nurse manager good manager	10415	37 (.35)	3.13 (.849)	6.2	11.8	45.0	36.9
NM4 praise and recognition	10429	23 (.22)	2.77 (.813)	7.5	24.7	51.2	16.6
NM5 manager backs up staff	10418	34 (.32)	3.09 (.837)	6.1	12.7	47.4	33.8
NP1 MD RN good relationships	10447	5 (.04)	3.1 (.603)	1.5	9.3	67.0	22.3
NP2 lot of team work	10440	12 (.11)	2.99 (.679)	2.1	17.1	60.3	20.5
NP3 RN MD collaboration	10426	26 (.24)	3 (.629)	1.9	14.3	66.0	17.8

Note. WNH = White/Non-Hispanic; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Figure 3

Bar Charts Depicting Percentage of Response Distribution by Groups, RNs-API (n = 3,806) and RNs-WNH (n = 10,452)

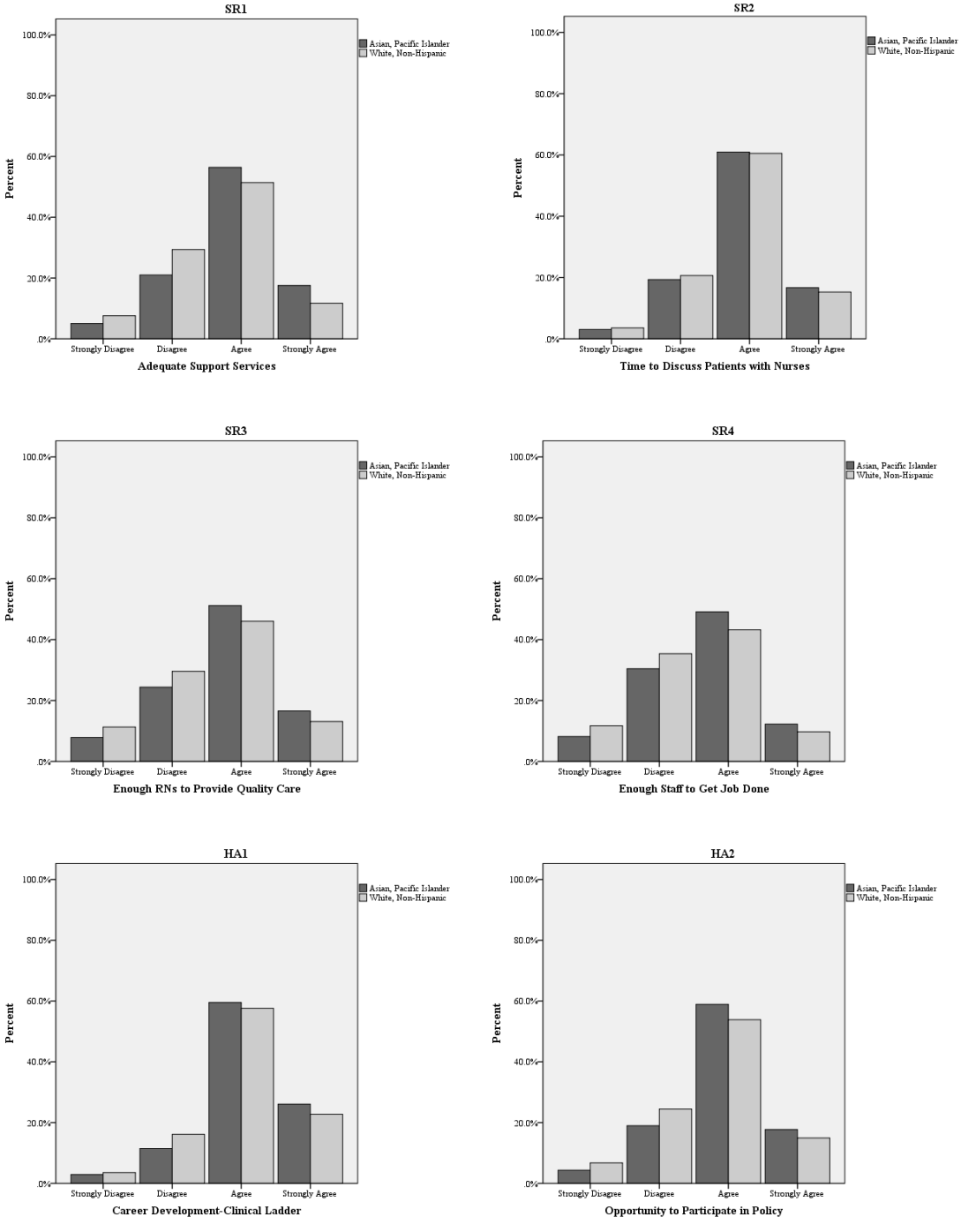


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Figure 3 (continued)

Bar Charts Depicting Percentage of Response Distribution by Groups, RNs-API (n = 3,806) and RNs-WNH (n = 10,452)

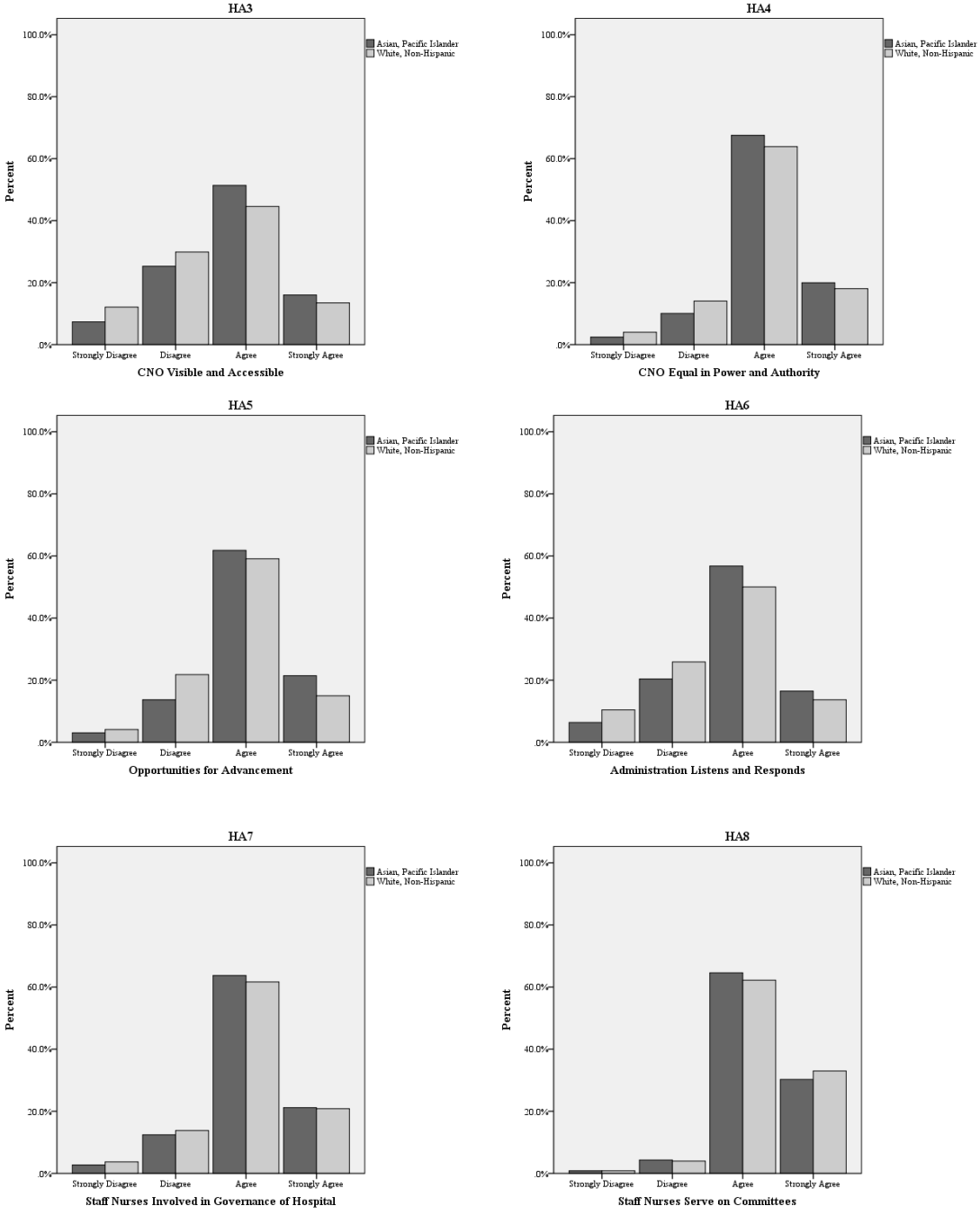

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Figure 3 (continued)

Bar Charts Depicting Percentage of Response Distribution by Groups, RNs-API (n = 3,806) and RNs-WNH (n = 10,452) (cont.)

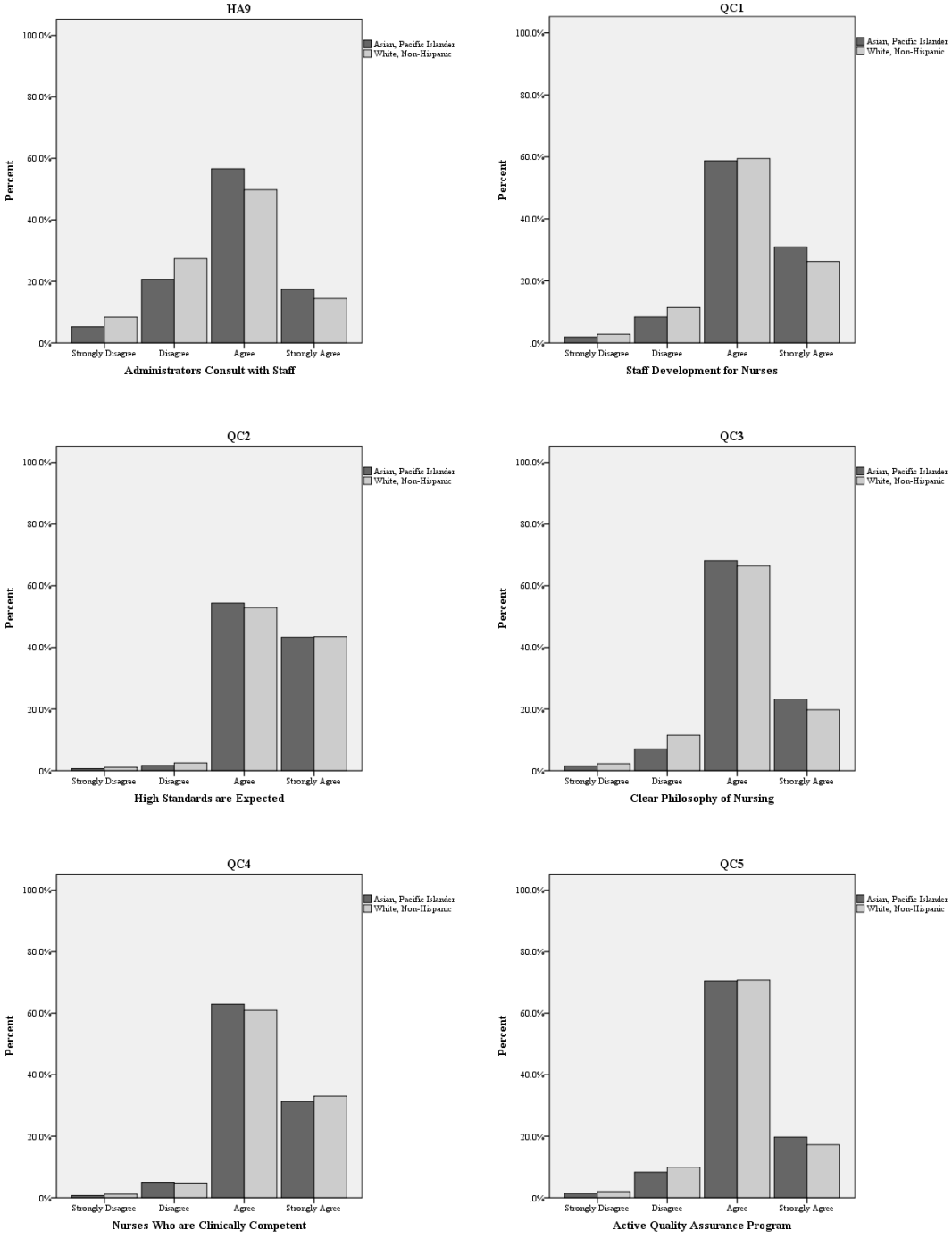

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Figure 3 (continued)

Bar Charts Depicting Percentage of Response Distribution by Groups, RNs-API (n = 3,806) and RNs-WNH (n = 10,452)

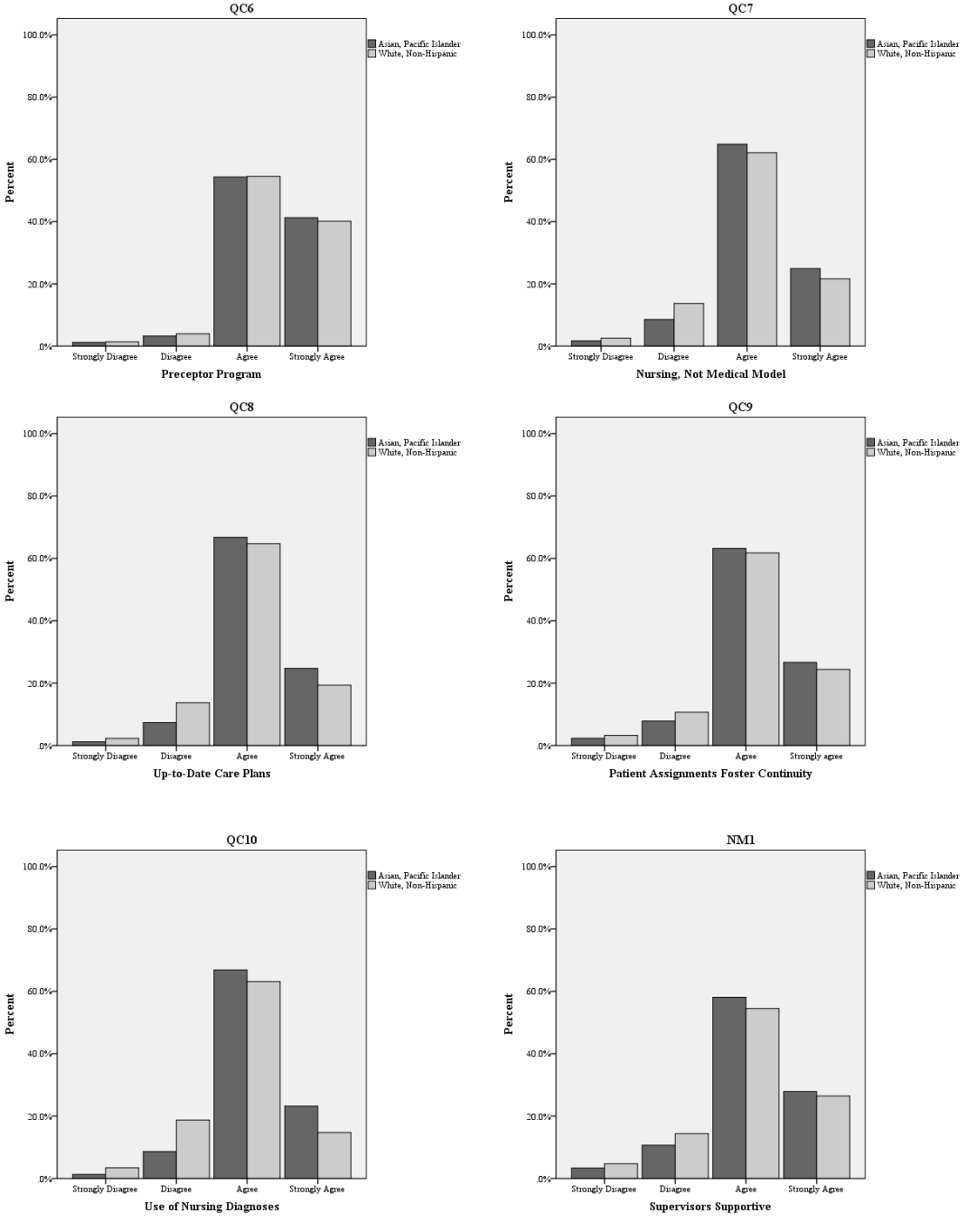

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Figure 3 (continued)

Bar Charts Depicting Percentage of Response Distribution by Groups, RNs-API (n = 3,806) and RNs-WNH (n = 10,452)

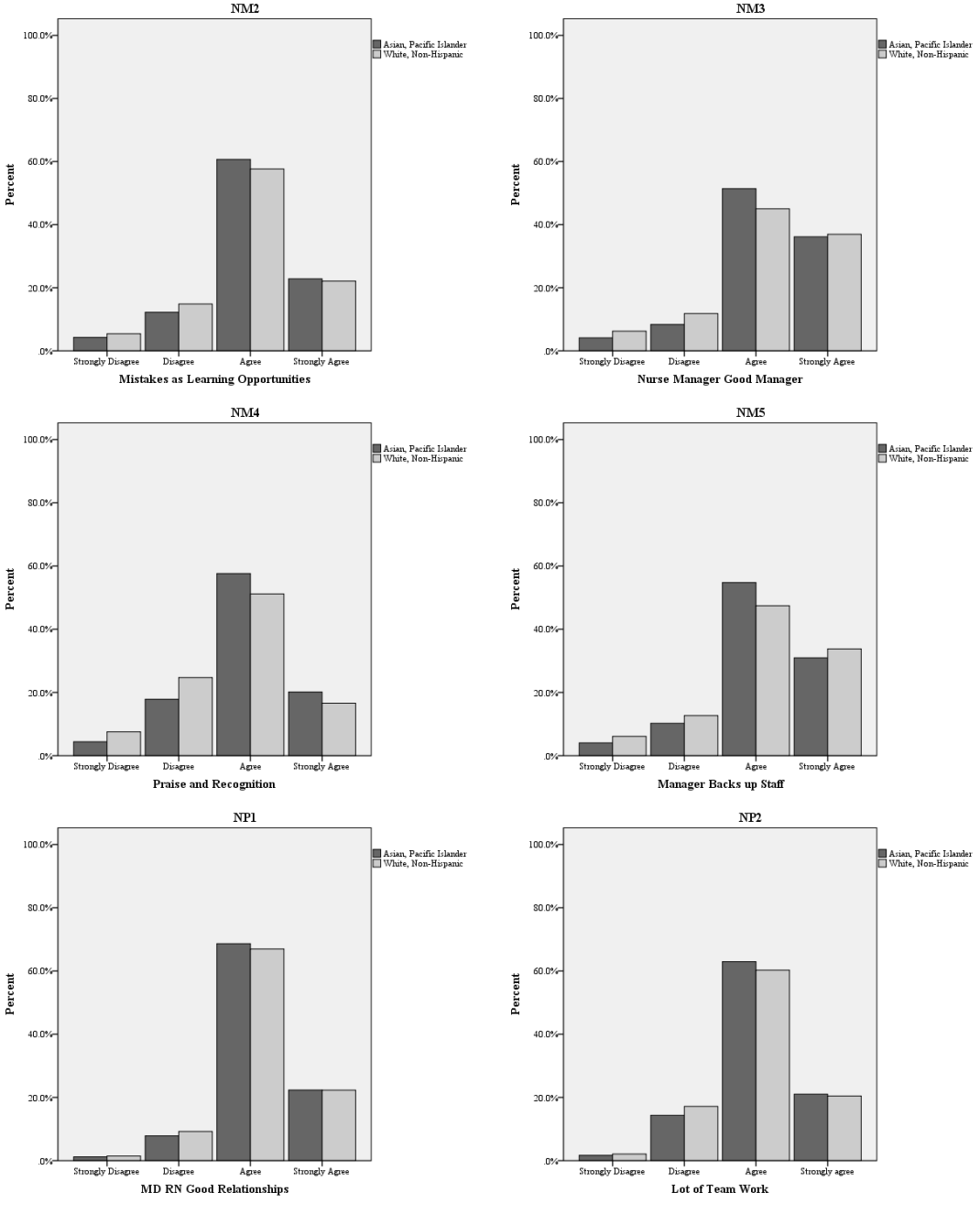

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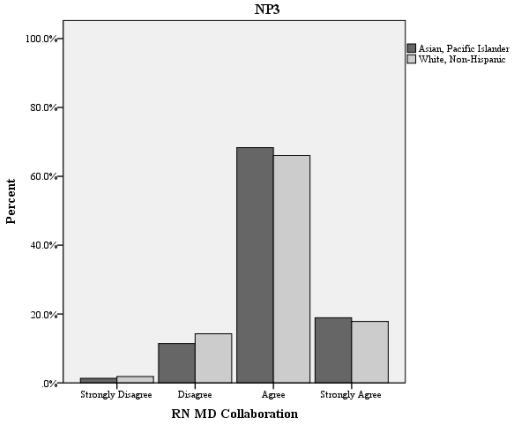
Figure 3 (continued)

Bar Charts Depicting Percentage of Response Distribution by Groups, RNs-API (n = 3,806) and RNs-WNH (n = 10,452)



Confirmatory Factor Analysis (Research Question Two)

Model Specification for Both Groups

Lake's (2002) model for the PES-NWI was used as the specified model (five latent factors and 31 indicators) for the confirmatory factor analysis (CFA; see Table 14 and Figure 4). All latent factors had three or more indicators. A CFA was conducted on each group (RNs-API and RNs-WNH). The latent factor variances were fixed at a value of one and the first indicator of each latent factor was allowed to be freely estimated. Cross-loading was set to zero (i.e. cross-loading was not allowed). By not allowing cross-loading to occur, there was potential for correlation values between factors to increase. Error covariances were set to zero as well. The number of known parameters was calculated to 496 (based on 31 indicators). There were 72 estimated parameters (31 factor loadings, 31error variances, and 10 factor covariances). The calculated degree of freedom was 424. It was an over identified model as the number of known parameters exceeded the number of free parameters in both groups (RNs-API = 103 and RNs-WNH = 103). This allowed for goodness of fit evaluation.

Table 14

Specification for the Five Factor Model, Practice Environment Scale – Nursing Work Index (PES-NWI)

Subscale	Definition/Items
Staffing and Resource Adequacy (StaffRes)	"Having adequate staff and support resources to provide quality patient care." a. (SR1) Adequate support services allow me to spend time with my patients. b. (SR2) Enough time and opportunity to discuss patient care problems with other nurses. c. (SR3) Enough registered nurses to provide quality patient care. d. (SR4) Enough staff to get the work done.
Nurse Participation in Hospital Affairs (HospAff)	"The participatory role and valued status of nurses in a broad hospital context." a. (HA1) Career development/clinical ladder opportunity. b. (HA2) Opportunity for staff nurses to participate in policy decisions. c. (HA3) A chief nursing officer which is highly visible and accessible to staff. d. (HA4) A chief nursing officer equal in power and authority to other top-level hospital executives. e. (HA5) Opportunities for advancement. f. (HA6) Administration that listens and responds to employee concerns. g. (HA7) Staff nurses are involved in the internal governance of the hospital (e.g. practice and policy committees). h. (HA8) Staff nurses have the opportunity to serve on hospital and nursing committees. i. (HA9) Nursing administrators consult with staff on daily problems and procedures.
Nurse Manager Ability, Leadership, and Supportive Nurses (NursMana)	"The critical role and key qualities of the nurse manager and ways the nurse manager supports the nurse." a. (NM1) A supervisory staff that is supportive of the nurses. b. (NM2) Supervisors use mistakes as learning opportunities, not criticism. c. (NM3) A nurse manager who was a good manager and leader. d. (NM4) Praise and recognition for a job well done. e. (NM5) A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician.

(continued)

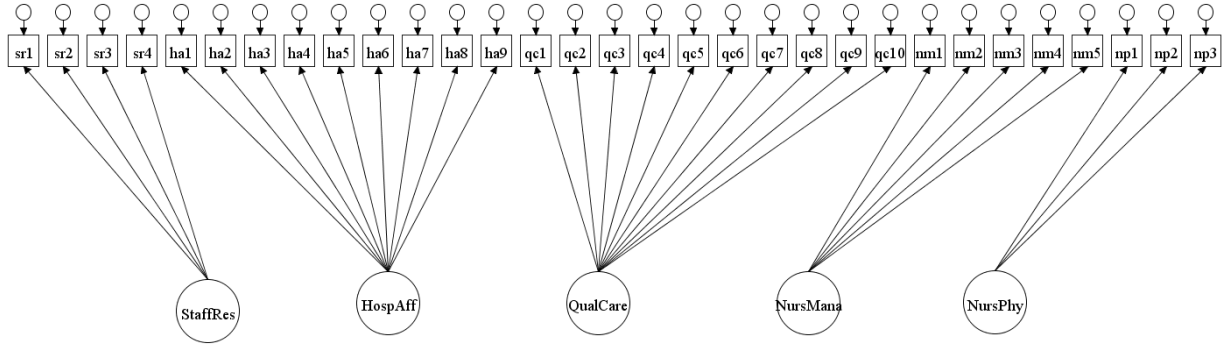
Table 14 (continued)

Specification for the Five Factor Model, Practice Environment Scale-Nursing Work Index (PES-NWI)

Subscale	Definition/Items
Nursing Foundations for Quality of Care (QualCare)	"The nursing foundations for a high standard of patient care: a pervasive nursing philosophy, a nursing (rather than a medical) model of care, and nurses a clinical competence and development." a. Construct validity assessment will be conducted by using the contrasting groups approach (Waltz et al., 2005, p. 156-157). (QC1) Active staff development or continuing education programs for nurses. b. (QC2) High standards of nursing care are expected by the administration. c. (QC3) A clear philosophy of nursing that pervades the patient care environment. d. (QC4) Working with nurses who are clinically competent. e. (QC5) An active quality assurance program. f. (QC6) A preceptor program for newly hired RNs. g. (QC7) Nursing care is based on a nursing, rather than a medical, model. h. (QC8) Written, up-to-date nursing care plans for all patients. i. (QC9) Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next. j. (QC10) Use of nursing diagnoses.
Collegial Nurse Physician Relations (NursPhy)	"The positive work relationships between nurses and physicians." a. (NP1) Physicians and nurses have good working relationships. b. (NP2) A lot of teamwork between nurses and physicians. c. (NP3) Collaboration (joint practice) between nurses and physicians.

Figure 4

Specification of the Five Factor Model, Practice Environment Scale-Nursing Work Index (PES-NWI)



Input Data for Both Groups

Multivariate normality was assumed due to the very large sample size per group, RNS-API (n = 3,806) and RNS-WNH (n = 10,452). There was less than 1% of data missing per each indicator. There was greater than 99% covariance coverage therefore missingness was not considered an issue. Mplus allowed for all responses to be retained by avoiding list wise deletion. The covariance matrix for items demonstrated positive relationships and the correlation matrix demonstrated positive relationships while providing the strength of each relationship. The majority of indicators within the specified latent factors tended to have moderate to strong positive correlation (see Tables 15 and 16). In addition, indicators had moderate to strong positive correlations with indicators outside the specified latent factor.

Table 15

Practice Environment Scale-Nursing Work Index(PES-NWI) Item Correlation Table for RNs-API (n = 3,806)

	SR1	SR2	SR3	SR4	HA1	HA2	HA3	HA4	HA5	HA6	HA7	HA8	HA9	QC1	QC2
SR1	1.000														
SR2	0.622	1.000													
SR3	0.639	0.601	1.000												
SR4	0.683	0.591	0.783	1.000											
HA1	0.469	0.464	0.439	0.443	1.000										
HA2	0.526	0.535	0.490	0.504	0.595	1.000									
HA3	0.469	0.461	0.450	0.482	0.455	0.533	1.000								
HA4	0.410	0.424	0.392	0.400	0.437	0.485	0.589	1.000							
HA5	0.497	0.494	0.464	0.477	0.750	0.591	0.505	0.494	1.000						
HA6	0.577	0.574	0.566	0.585	0.537	0.617	0.615	0.549	0.603	1.000					
HA7	0.485	0.507	0.465	0.475	0.517	0.667	0.482	0.514	0.568	0.612	1.000				
HA8	0.425	0.476	0.408	0.405	0.510	0.506	0.389	0.473	0.541	0.501	0.615	1.000			
HA9	0.510	0.518	0.489	0.506	0.481	0.585	0.588	0.518	0.552	0.691	0.583	0.509	1.000		
QC1	0.478	0.470	0.426	0.427	0.667	0.529	0.425	0.430	0.588	0.503	0.500	0.519	0.473	1.000	
QC2	0.294	0.326	0.310	0.274	0.367	0.339	0.292	0.429	0.377	0.356	0.379	0.464	0.343	0.395	1.000
QC3	0.528	0.568	0.502	0.517	0.525	0.544	0.481	0.522	0.590	0.577	0.591	0.566	0.544	0.517	0.486
QC4	0.394	0.441	0.373	0.364	0.389	0.390	0.315	0.379	0.451	0.420	0.440	0.474	0.407	0.415	0.467
QC5	0.508	0.543	0.493	0.505	0.526	0.540	0.488	0.528	0.577	0.647	0.614	0.579	0.584	0.543	0.444
QC6	0.357	0.391	0.359	0.348	0.423	0.388	0.331	0.393	0.449	0.418	0.444	0.544	0.403	0.456	0.429
QC7	0.478	0.503	0.462	0.462	0.441	0.491	0.430	0.483	0.490	0.538	0.559	0.585	0.530	0.477	0.437
QC8	0.399	0.457	0.399	0.397	0.400	0.406	0.356	0.411	0.442	0.436	0.448	0.492	0.461	0.441	0.420
QC9	0.424	0.471	0.429	0.407	0.406	0.427	0.343	0.389	0.426	0.451	0.471	0.467	0.468	0.425	0.363
QC10	0.361	0.419	0.355	0.351	0.381	0.394	0.357	0.398	0.440	0.420	0.434	0.467	0.432	0.415	0.371
NM1	0.577	0.532	0.501	0.510	0.497	0.541	0.462	0.425	0.500	0.610	0.482	0.458	0.546	0.508	0.376
NM2	0.486	0.512	0.460	0.464	0.505	0.574	0.452	0.426	0.504	0.584	0.501	0.448	0.534	0.470	0.326
NM3	0.473	0.473	0.445	0.454	0.464	0.495	0.467	0.403	0.483	0.570	0.455	0.407	0.498	0.438	0.362
NM4	0.532	0.535	0.489	0.537	0.529	0.559	0.506	0.462	0.591	0.616	0.524	0.488	0.575	0.501	0.378
NM5	0.436	0.473	0.413	0.427	0.475	0.507	0.439	0.438	0.502	0.606	0.500	0.456	0.527	0.451	0.370
NP1	0.454	0.427	0.388	0.378	0.392	0.391	0.345	0.338	0.410	0.403	0.381	0.379	0.374	0.408	0.330
NP2	0.449	0.490	0.431	0.443	0.394	0.431	0.385	0.408	0.472	0.479	0.457	0.434	0.459	0.409	0.376
NP3	0.452	0.503	0.440	0.441	0.436	0.465	0.425	0.437	0.486	0.511	0.543	0.476	0.497	0.456	0.379

	QC3	QC4	QC5	QC6	QC7	QC8	QC9	QC10	NM1	NM2	NM3	NM4	NM5	NP1	NP2	NP3
QC3	1.000															
QC4	0.55	1.000														
QC5	0.65	0.499	1.000													
QC6	0.488	0.459	0.49	1.000												
QC7	0.608	0.494	0.592	0.529	1.000											
QC8	0.534	0.49	0.519	0.456	0.533	1.000										
QC9	0.51	0.45	0.507	0.445	0.512	0.52	1.000									
QC10	0.513	0.441	0.503	0.409	0.542	0.599	0.526	1.000								
NM1	0.52	0.439	0.541	0.417	0.47	0.387	0.445	0.352	1.000							
NM2	0.519	0.407	0.52	0.4	0.463	0.369	0.397	0.343	0.654	1						
NM3	0.494	0.401	0.499	0.385	0.423	0.349	0.406	0.32	0.644	0.605	1.000					
NM4	0.565	0.423	0.564	0.42	0.504	0.426	0.447	0.409	0.581	0.587	0.569	1.000				
NM5	0.522	0.466	0.536	0.426	0.477	0.39	0.438	0.363	0.614	0.609	0.738	0.572	1.000			
NP1	0.431	0.404	0.436	0.336	0.416	0.364	0.372	0.369	0.435	0.376	0.339	0.405	0.36	1.000		
NP2	0.527	0.466	0.505	0.387	0.481	0.449	0.421	0.421	0.429	0.411	0.387	0.492	0.42	0.653	1.000	
NP3	0.541	0.461	0.567	0.415	0.528	0.484	0.462	0.477	0.43	0.432	0.388	0.5	0.437	0.633	0.723	1.000

Note. API = Asian/Pacific Islander; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Table 16

Practice Environment Scale-Nursing Work Index (PES-NWI) Item Correlation Table for RNs-WNH (n = 10,452)

	SR1	SR2	SR3	SR4	HA1	HA2	HA3	HA4	HA5	HA6	HA7	HA8	HA9	QC1	QC2
SR1	1.000														
SR2	0.590	1.000													
SR3	0.635	0.597	1.000												
SR4	0.683	0.591	0.791	1.000											
HA1	0.383	0.398	0.364	0.371	1.000										
HA2	0.458	0.466	0.434	0.441	0.529	1.000									
HA3	0.398	0.394	0.378	0.404	0.409	0.480	1.000								
HA4	0.343	0.364	0.335	0.341	0.393	0.432	0.591	1.000							
HA5	0.419	0.435	0.399	0.410	0.712	0.543	0.445	0.427	1.000						
HA6	0.530	0.497	0.508	0.530	0.475	0.583	0.585	0.503	0.535	1.000					
HA7	0.409	0.436	0.398	0.405	0.460	0.647	0.446	0.452	0.491	0.549	1.000				
HA8	0.333	0.402	0.348	0.343	0.460	0.496	0.363	0.409	0.468	0.437	0.584	1.000			
HA9	0.477	0.468	0.444	0.464	0.455	0.561	0.557	0.470	0.504	0.668	0.533	0.448	1.000		
QC1	0.391	0.394	0.366	0.365	0.624	0.500	0.393	0.388	0.546	0.466	0.470	0.466	0.458	1.000	
QC2	0.256	0.299	0.267	0.247	0.337	0.309	0.284	0.394	0.344	0.345	0.346	0.425	0.340	0.379	1.000
QC3	0.489	0.512	0.458	0.456	0.477	0.517	0.451	0.470	0.541	0.551	0.522	0.490	0.529	0.494	0.468
QC4	0.326	0.371	0.345	0.329	0.319	0.340	0.273	0.294	0.352	0.359	0.361	0.394	0.350	0.363	0.418
QC5	0.456	0.486	0.450	0.453	0.474	0.512	0.450	0.484	0.517	0.577	0.545	0.482	0.523	0.495	0.422
QC6	0.297	0.337	0.299	0.292	0.369	0.341	0.285	0.335	0.368	0.365	0.392	0.468	0.363	0.399	0.396
QC7	0.436	0.478	0.416	0.427	0.410	0.455	0.393	0.425	0.446	0.485	0.482	0.492	0.487	0.417	0.371
QC8	0.329	0.363	0.326	0.332	0.333	0.346	0.308	0.332	0.359	0.355	0.366	0.379	0.396	0.368	0.332
QC9	0.413	0.437	0.413	0.412	0.355	0.382	0.327	0.333	0.398	0.424	0.381	0.415	0.416	0.372	0.345
QC10	0.325	0.343	0.310	0.324	0.335	0.365	0.326	0.326	0.373	0.364	0.351	0.342	0.387	0.348	0.284
NM1	0.525	0.488	0.478	0.477	0.448	0.513	0.451	0.393	0.483	0.595	0.449	0.414	0.527	0.469	0.367
NM2	0.427	0.461	0.398	0.398	0.431	0.505	0.411	0.371	0.468	0.541	0.454	0.410	0.491	0.427	0.361
NM3	0.416	0.393	0.398	0.396	0.397	0.432	0.408	0.316	0.424	0.516	0.382	0.355	0.456	0.398	0.344
NM4	0.494	0.487	0.468	0.490	0.488	0.532	0.462	0.405	0.549	0.591	0.489	0.432	0.541	0.465	0.352
NM5	0.403	0.396	0.376	0.373	0.409	0.456	0.389	0.341	0.442	0.544	0.432	0.384	0.476	0.403	0.358
NP1	0.341	0.362	0.322	0.322	0.283	0.314	0.263	0.287	0.320	0.316	0.310	0.315	0.299	0.292	0.279
NP2	0.353	0.406	0.358	0.365	0.320	0.358	0.308	0.332	0.385	0.364	0.361	0.348	0.362	0.327	0.305
NP3	0.376	0.430	0.377	0.384	0.359	0.415	0.335	0.357	0.421	0.416	0.455	0.409	0.422	0.364	0.326

	QC3	QC4	QC5	QC6	QC7	QC8	QC9	QC10	NM1	NM2	NM3	NM4	NM5	NP1	NP2	NP3
QC3	1.000															
QC4	0.470	1.000														
QC5	0.610	0.424	1.000													
QC6	0.419	0.402	0.403	1.000												
QC7	0.579	0.401	0.511	0.437	1.000											
QC8	0.446	0.345	0.426	0.338	0.419	1.000										
QC9	0.453	0.402	0.436	0.362	0.439	0.421	1.000									
QC10	0.449	0.294	0.411	0.291	0.435	0.565	0.410	1.000								
NM1	0.513	0.389	0.501	0.370	0.431	0.332	0.437	0.313	1.000							
NM2	0.466	0.356	0.483	0.347	0.428	0.316	0.399	0.309	0.655	1.000						
NM3	0.431	0.351	0.433	0.335	0.362	0.283	0.375	0.272	0.672	0.603	1.000					
NM4	0.510	0.374	0.520	0.357	0.461	0.352	0.433	0.350	0.613	0.588	0.574	1.000				
NM5	0.458	0.380	0.468	0.348	0.406	0.292	0.396	0.285	0.640	0.613	0.763	0.572	1.000			
NP1	0.372	0.330	0.355	0.272	0.359	0.284	0.330	0.275	0.373	0.304	0.272	0.334	0.286	1.000		
NP2	0.431	0.380	0.402	0.306	0.412	0.323	0.371	0.328	0.373	0.336	0.303	0.388	0.328	0.679	1.000	
NP3	0.475	0.385	0.470	0.359	0.473	0.373	0.402	0.380	0.390	0.367	0.314	0.417	0.362	0.650	0.739	1.000

Note. WNH = White/Non-Hispanic; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Model Estimation for Both Groups

Analysis was conducted using Mplus (version 7.3). Mplus allows for raw data to be read and analyses were based on the variance-covariance matrixes. The estimator used was full information maximum likelihood (FIML) and considered appropriate based on the large size of the sample, indicator response values treated as interval, the presence of minimal missing data, and the assumption of multivariate normality.

Model Evaluation for RNs-API

As expected, the chi-square (classic goodness of fit) was significant (χ^2 = 7808.559, *df* = 424, $p < .001$). This would be interpreted as the model does not fit the data well; however, when there are very large sample sizes the chi-square is not a strong indicator for goodness of fit. Other fit indices where examined for overall model fit. To determine if the model fits the population reasonably the root mean square error of approximation (RMSEA) was evaluated. RMSEA results < .06 would be considered strong model fit to the population and .06 to .08 would be considered adequate fit to the population. The same levels also are considered for the higher end of the RMSEA 90% confidence interval (CI). In this study the *RMSEA* was .068 with a 90% confidence interval of .066 – .069 (tight). There are fit indices that examine comparison to a more restricted model, Comparative Fit Index (*CFI*), and penalty for adding free estimating parameters without improving the overall model, Tucker-Lewis Index (*TLI*). For both indices, a value equal to or above .95 indicates a strong fit and a value from .90 to .949 indicate adequate fit. The indices values were *CFI* = .907 and *TLI* = .898. The *CFI* was interpreted as adequate while the *TLI* was interpreted as not adequate. Caution should be taken if index values are less than .90. Standardized root mean square residual (*SRMR*) value signifies discrepancy between the observed and predicated correlations. A value that equals zero suggests perfect fit. The *SRMR* = .043.

All estimates (factor loadings) had values > .3 (see Figure 5) and $p < .001$. Latent factors were allowed to correlate (see Table 17). The square of the factor loading equals the communality. The communality reflects the amount of variance that is explained by the factor. For example, the indicator SR2 (“Enough time and opportunity to discuss patient care problems with other nurses.”) has a factor loading of .749, the communality is .561 which is interpreted as 56% of the variance in SR2 is explained by the latent factor (Staffing and Resource Adequacy).

Figure 5

Five Factor Model of the Practice Envrionment Scale-Nursing Work Index (PES-NWI) with Standardized Values for RNs-API (n = 3,806)

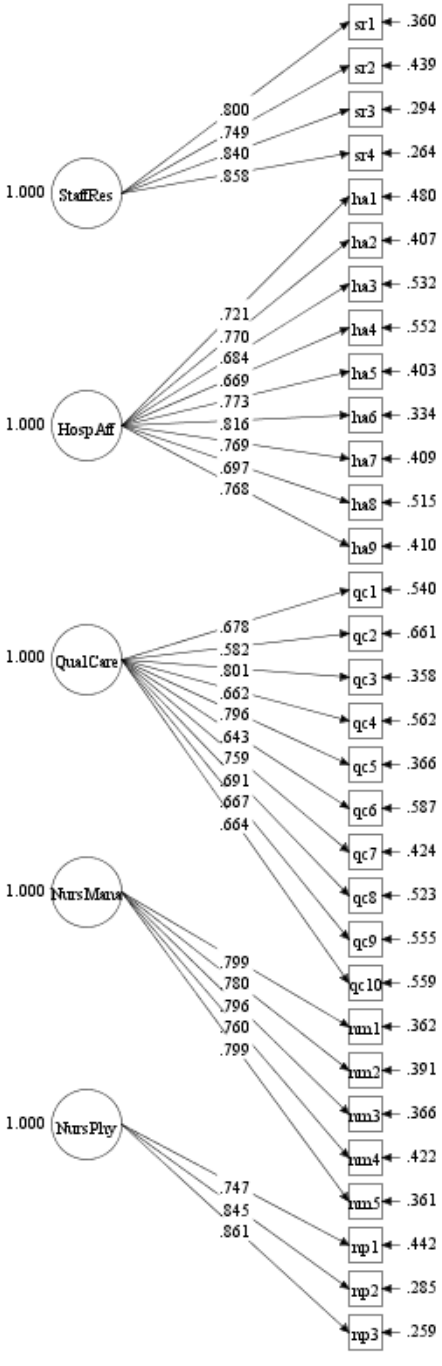


Table 17

Latent Factor Correlation Matrix of the Practice Envrionment Scale-Nursing Work Index (PES-NWI) for RNs-API (n = 3,806)

Latent Factors	StaffRes	HospAff	QualCare	NursMana	NursPhy
StaffRes	1.000				
HospAff	0.789	1.000			
QualCare	0.747	0.898	1.000		
NursMana	0.744	0.863	0.801	1.000	
NursPhy	0.647	0.714	0.773	0.642	1.000

Note. API = Asian/Pacific Islander; StaffRes = Staffing and resource adequacy; HospAff = Nurse participation in hospital affairs; QualCare = Nursing foundations for quality of care; NursMana = Nurse manager ability, leadership, and supportive nurses; NursPhy = Collegial nurse physician relations.

Model Evaluation for RNs-WNH

The *chi-square* was significant (χ^2 = 19375.623, *df* = 424, $p < .001$). As mentioned previously, the *chi-square* was not a strong indicator for goodness of fit due to the study sample size. Other fit indices were examined. The *RMSEA* = .065 with a 90% confidence interval of .065 - .066 (tight), *CFI* = .903, *TLI* = .893, and the *SRMR* = .045. All estimates (factor loadings) had values > .3 (see Figure 6) and $p < .001$. Latent factors were allowed to correlate (see Table 18).

Figure 6

Five Factor Model of the Practice Environment Scale-Nursing Work Index (PES-NWI) with Standardized Values for RNs-WNH (n = 10,452)

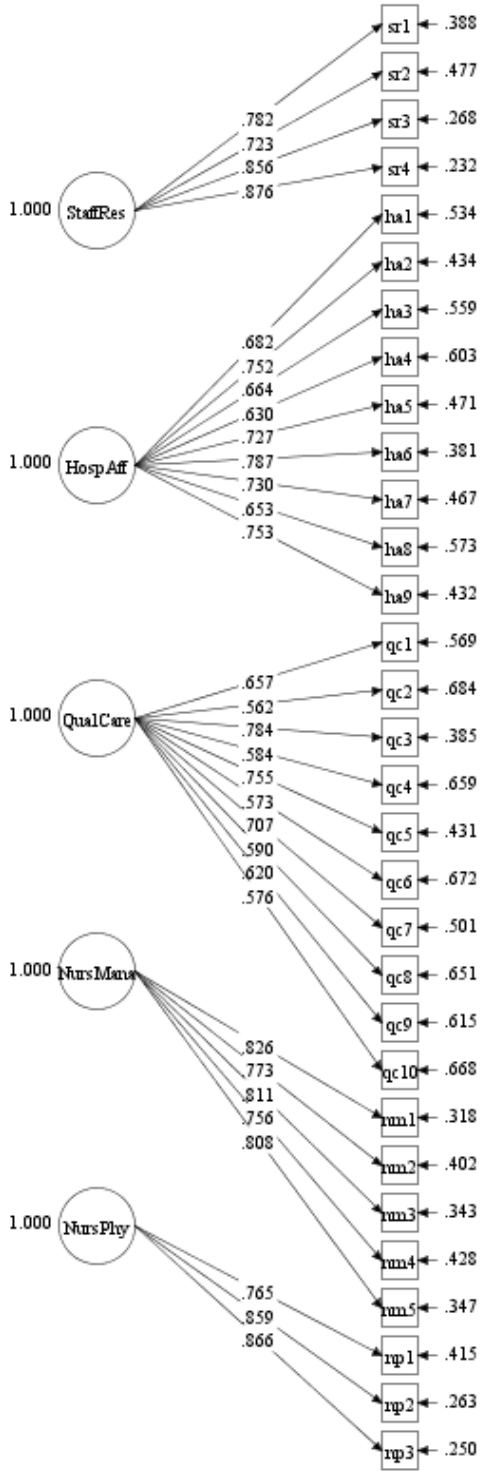


Table 18

Latent Factor Correlation Matrix of the Practice Envrionment Scale-Nursing Work Index (PES-NWI) for RNs-WNH (n = 10,452)

Latent Factors	StaffRes	HospAff	QualCare	NursMana	NursPhy
StaffRes	1.000				
HospAff	0.709	1.000			
QualCare	0.707	0.901	1.000		
NursMana	0.654	0.806	0.766	1.000	
NursPhy	0.526	0.598	0.676	0.517	1.000

Note. WNH = White/Non-Hispanic; StaffRes = Staffing and resource adequacy; HospAff = Nurse participation in hospital affairs; QualCare = Nursing foundations for quality of care; NursMana = Nurse manager ability, leadership, and supportive nurses; NursPhy = Collegial nurse physician relations.

PES-NWI Model Conclusion for RNs-API and RNs-WNH

The goodness-of-fit indices were examined to determine the extent of model fit. Guidelines for determining a strong model fit consisted of *SRMR* value of < .08, *RMSEA* value < .06, and *CFI/TLI* values ≥ .95. Brown (2015) recommended that less conservative measures be considered when there is some amount of strain on the model, numerous indicators, or the model has several factors.

Less conservative measures focus on adequate fit versus good/strong fit. *RMSEA* values between .6 and .8 should be considered as adequate fit and to consider rejecting the model if the *RMSEA* value is ≥ 1.0. The upper end of the *RMSEA 90%* confident level (*CI*) should not exceed .08. In addition, *CFI/TLI* values of .90 to .949 should be considered as adequate fit and to consider caution when values are less than < .90.

Of the fit indices, *SRMR* met the conservative guideline of < .08 (RNs –API = .043 and RNs-WNH = .045). The majority of results meet the less than conservative recommendations of adequate fit. The CFA result identified minimal areas of strain on the model and was noted by examining the standardized residuals (*z*-score matrix) for covariance/correlations/residual correlation matrixes. This would aid in identifying relationships between indicators that were underestimated. Furthermore, the instrument had numerous indicators (31), and several factors

(5). The *RMSEA* for both groups (RNs-API = .068 and RNs-WNH = .065) were < .08. Both also had upper end *RMSEA 90% CI* < .08 (RNs-API = .069 and RNs-WNH = .066). The *CFI* results for both groups were found to be adequate as values were > .90 (RNs-API = .907 and RNs-WNH = .903). Unfortunately the *TLI* values were < .9 (RNs-API = .898 and RNs-WNH .893). Despite having a *TLI* value < .9, the actual values were close to .9 and all other indices suggest adequate fit. The overall conclusion was the PES-NWI demonstrated adequate model fit for both groups that must be demonstrated before testing for invariance.

Testing for Invariance (Research Question 2)

In testing for invariance, CFA with multiple groups was used. This would be a test of similarity and not a test of differences. This was analyzed using Mplus (version 7.3). The process for invariance testing was guided by Brown (2015) and Little (2013). Per Little (2013), longitudinal CFA modeling may be used for multiple groups CFA. Three analyses were undertaken to determine if measurement equivalence was present in the PES-NWI. The three estimated models were configural (equal form) invariance, weak (metric) invariance, and strong (scalar) invariance. Testing for configural invariance was the first analysis due to application of least restrictive constraints on the model and it served as the baseline. The process of application of least restrictive constraints on the model to increasing restrictive constraints was selected as it would help identify areas that had contributed to noninvariance. This approach would have identified factors contributing to a partial invariance.

Full information maximum likelihood (FIML) estimation was used in the invariance testing. Initially a method of scaling, marked indicator approach was taken. This fixed the first indicator of the latent factor as the marker indicator and fixed to a value of one. This allowed the latent factor variances to be estimated (see Appendix A). After the mentioned method of scaling was used, the fixed latent variance method of scaling was conducted for the three invariance

model testing. In this method, all indicators were allowed to be freely estimated while setting the factor variances to one (same method used in single group CFA; see Appendix A). RNs-WNH group was the reference group in the analyses. The groups had unequal sample sizes as the case matching allowed for a maximum match of four RNs-WNH to one RN-API. This sample difference led to different chi-square contribution as expected.

Configural Invariance (Equal Form)

Configural invariance was used to determine if the pattern for indicators loading on the latent factor was the same across groups. This type of invariance was the baseline for the invariance testing. In configural invariance testing, the pattern of loadings was examined after centering the latent factor means to zero (see Table 19 and Appendix B). All other parameters were allowed to be freely estimated. The majority of the latent factors had the same sequence of magnitude of factor loadings across groups with the exception of items loading on the latent factor, Nursing Foundations for Quality of Care. The sequence of magnitude of factor loadings did not follow the same pattern across the groups. There was noted deviation. The majority of the latent factors had the same intercept patterns (sequence of mean values) with the exception of the latent factors, Nursing Foundations for Quality of Care (QualCare) and Nurse Participation in Hospital Affairs (NursAff). There was deviation in the intercept patterns for QualCare much like the factor loading values. All factor loadings had a $p < .001$ in both methods of scaling (with the exception of the marked indicators).

The fit indices for the configural invariance testing were similar to the individual group CFA results (see Table 23). The chi-square was significant ($\chi^2 = 27184.181$, $df = 848$, $p < .001$). The *RMSEA* = 0.066 with a *90% CI* of .065 - .067 (tight). Other fit indices results were *CFI* = .904 and *TLI* = .895;the *SRMR* = .044. The patterns (factor loading and intercepts) were

generally similar and the fit indices suggest adequate model fit and configural invariance.

Presence of configural invariance allows for the next step to proceed, weak invariance testing.

Table 19

Configural Invariance: Unstandardized Factor Loading and Intercept Patterns Across Groups for the Fixed Variance Method of Scaling

Latent Factor by Indicator	Factor Loadings		Intercepts	
	RNs-API	RNs-WNH	RNs-API	RNs-WNH
StaffRes:				
SR1	.603[2]	.609[2]	2.865[3]	2.672[3]
SR2	.516[1]	.504[1]	2.913[4]	2.875[4]
SR3	.688[4]	.729[4]	2.764[2]	2.609[2]
SR4	.684[3]	.722[3]	2.654[1]	2.510[1]
HospAff:				
HA1	.502[3]	.497[3]	3.088[8]	2.995[8]
HA2	.561[7]	.588[7]	2.900[4]	2.770[4]
HA3	.551[6]	.576[6]	2.760[1]	2.595[1]
HA4	.420[2]	.436[2]	**3.050[7]**	**2.959[6]**
HA5	.531[5]	.519[5]	3.016[5]	2.849[5]
HA6	.630[9]	.660[9]	2.833[2]	2.670[2]
HA7	.512[4]	.513[4]	**3.032[6]**	**2.995[7]**
HA8	.394[1]	.374[1]	3.242[9]	3.273[9]
HA9	.581[8]	.614[8]	2.863[3]	2.702[3]
QualCare:				
QC1	**.447[7]**	**.455[8]**	3.189[7]	3.092[7]
QC2	.326[1]	.334[1]	3.403[10]	3.388[10]
QC3	.473[10]	.498[10]	**3.130[4]**	**3.036[5]**
QC4	.381[2]	.349[2]	3.248[8]	3.260[8]
QC5	**.457[8]**	**.448[7]**	**3.086[1]**	**3.032[4]**
QC6	.387[3]	.355[3]	3.357[9]	3.334[9]
QC7	.471[9]	.476[9]	3.129[3]	3.028[3]
QC8	**.406[5]**	**.383[4]**	**3.150[6]**	**3.011[2]**
QC9	.431[6]	.427[6]	**3.142[5]**	**3.073[6]**
QC10	**.396[4]**	**.390[5]**	**3.119[2]**	**2.892[1]**
NursMana:				
NM1	.570[3]	.638[3]	3.104[3]	3.026[3]
NM2	.563[1]	.591[1]	3.021[2]	2.965[2]
NM3	.602[5]	.688[5]	3.195[5]	3.126[5]
NM4	.565[2]	.615[2]	2.934[1]	2.768[1]
NM5	.597[4]	.677[4]	3.126[4]	3.088[4]

(continued)

Table 19 (continued)

Configural Invariance: Unstandardized Factor Loading and Intercept Patterns Across Groups for the Fixed Variance Method of Scaling

Latent Factor by Indicator	Factor Loadings		Intercepts	
	RNs-API	RNs-WNH	RNs-API	RNs-WNH
NursPhy:				
NP1	.433[1]	.461[1]	3.121[3]	3.101[3]
NP2	.548[3]	.583[3]	3.033[1]	2.991[1]
NP3	.513[2]	.544[2]	3.048[2]	2.998[2]

Note. Numerical subscripts denote sequence/pattern of factor loading/intercept within the latent factor; API = Asian/Pacific Islander; WNH = White/Non-Hispanic; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Weak Invariance (Metric Invariance)

The next step in the process was to determine if the factor loadings of the PES-NWI indicators were equivalent across RNs-API and RNs-WNH. This analysis assisted in determining if the meanings of the indicators and the structure of the construct being measured was the same across groups. Testing weak invariance required the constraint of forcing the indicator's factor loadings to be equal (mathematically) across groups (see Table 20 and Appendix C). The latent factor variances were allowed to be freely estimated in the marker indicator method of scaling. Weak invariance was then tested by allowing RNs-WNH latent factor variances to be fixed at one which served as the reference and the RNs-API latent factor variances would be estimated to equal one or be close to the value of one. In both methods the intercepts and the residual variances were allowed to be freely estimated. All factor loadings had a $p < .001$ in both methods of scaling (with the exception of the marked indicators).

The fit indices for the weak invariance test were similar to the configural invariance testing results (negligible changes) for the fixed variance and marked indicator method of scaling (see Table 23). The *chi-square* was significant ($\chi^2 = 27296.121$, $df = 874$, $p < .001$). The *RMSEA* = .065 with a *90% CI* of .064 - .066. Other fit indices results were *CFI* = .904 and *TLI* = .897; the *SRMR* = .045. Changes across $CFI \leq .01$ and negligible changes in other fit indices of the

configural and weak invariance suggests metric invariance. There were no CFI value changes and all other fit indices had negligible changes if values were altered due to the constraints placed. The indicators' factor loadings were equal across groups and the fit indices suggest presence of weak (metric) invariance. This allowed for the next step, strong invariance testing.

Table 20

Metric Invariance: Unstandardized Factor Loadings Across Groups for Fixed Factor Variance Method of Scaling

	Factor Loadings	
Latent Factor BY Indicator	RNs-API	RNs-WNH
StaffRes:		
SR1	.613	.613
SR2	.512	.512
SR3	.725	.725
SR4	.718	.718
HospAff:		
HA1	.502	.502
HA2	.583	.583
HA3	.572	.572
HA4	.434	.434
HA5	.526	.526
HA6	.654	.654
HA7	.516	.516
HA8	.382	.382
HA9	.608	.608
QualCare:		
QC1	.452	.452
QC2	.331	.331
QC3	.489	.489
QC4	.359	.359
QC5	.450	.450
QC6	.364	.364
QC7	.473	.473
QC8	.391	.391
QC9	.427	.427
QC10	.392	.392

(continued)

Table 20 (continued)

Metric Invariance: Unstandardized Factor Loadings Across Groups for Fixed Factor Variance Method of Scaling

Latent Factor BY Indicator	Factor Loadings	
	RNs-API	RNs-WNH
NursMana:		
NM1	.637	.637
NM2	.600	.600
NM3	.682	.682
NM4	.618	.618
NM5	.673	.673
NursPhy:		
NP1	.461	.461
NP2	.583	.583
NP3	.545	.545

Note. API=Asian/Pacific Islander; WNH = White/Non-Hispanic; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Strong (Scalar) Invariance, Measurement Equivalence

Strong invariance testing focused on the indicators' intercepts (means). Much like weak invariance testing, the intercepts were constrained to be mathematically equal (see Table 21 and Appendix D) which forced the latent factor means to equal zero in one group (the reference group – RNs-WNH) but allowed the other group's (RNs-API) latent factor means to be freely estimated and was expected to have a mean value close to zero (see Table 22 and Appendix E). In addition, constraints imposed on the indicators' factor loadings in the weak invariance model were maintained (see Table 21 and Appendix D). All factor loadings had a $p < .001$ in both methods of scaling (with the exception of the marker indicator).

Table 21

Strong (Scalar) Invariance: Unstandardized Factor Loadings and Intercepts Across Groups for Fixed Factor Variance Method of Scaling

Latent Factor BY Indicator	Factor Loadings		Intercepts	
	RNs-API	RNs-WNH	RNs-API	RNs-WNH
StaffRes:				
SR1	.616	.616	2.690	2.690
SR2	.508	.508	2.856	2.856
SR3	.725	.725	2.610	2.610
SR4	.719	.719	2.508	2.508
HospAff:				
HA1	.501	.501	2.992	2.992
HA2	.584	.584	2.773	2.773
HA3	.575	.575	2.609	2.609
HA4	.434	.434	2.959	2.959
HA5	.529	.529	2.867	2.867
HA6	.656	.656	2.679	2.679
HA7	.512	.512	2.974	2.974
HA8	.377	.377	3.242	3.242
HA9	.610	.610	2.713	2.713
QualCare:				
QC1	.453	.453	3.095	3.095
QC2	.329	.329	3.373	3.373
QC3	.489	.483	3.036	3.036
QC4	.355	.355	3.235	3.235
QC5	.449	.449	3.022	3.022
QC6	.362	.362	3.320	3.320
QC7	.474	.474	3.031	3.031
QC8	.394	.394	3.033	3.033
QC9	.427	.427	3.069	3.069
QC10	.398	.398	2.944	2.944
NurMan:				
NM1	.637	.637	3.026	3.026
NM2	.599	.599	2.960	2.960
NM3	.682	.682	3.122	3.122
NM4	.620	.620	2.795	2.795
NM5	.671	.671	3.075	3.075
NurPhy:				
NP1	.461	.461	3.097	3.097
NP2	.583	.583	2.990	2.990
NP3	.545	.545	3.001	3.001

Note. API=Asian/Pacific Islander; WNH = White/Non-Hispanic; SR = Staffing and Resources; HA = Hospital Affairs; QC = Quality Care, NM = Nurse Manager; NP= Nurse Physician.

Table 22

Strong (Scalar) Invariance: Latent Factors Means and Variances Across Groups for the Fixed Factor Variance Method of Scaling

Latent Factors	*M*		*Variances*	
	RNs- API	RNs-WNH	RNs-API	RNs-WNH
StaffRes:	.210	0	.934	1
HospAff:	.206	0	.959	1
QualCare:	.192	0	1.012	1
NursMana:	.122	0	.812	1
NursPhy:	.075	0	.885	1

Note. API = Asian/Pacific Islander; WNH= White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare= Quality Care; NursMana = Nurse Manager; NursPhy = Nurse Physician.

The fit indices from the strong invariance model were very similar (negligible changes) to the weak (metric) invariance model (see Table 23). The *chi-square* was significant (χ^2 = 28388.511, *df* = 900, $p < .001$). The *RMSEA* = .065 with a *90% CI* of .065 - .066. Other fit indices results were *CFI* = .900 and *TLI* = .896;the *SRMR* = .047. The *CFI* value decreased by .004 (which was less than the .01 recommendation). The indicators' factor loadings and intercepts were equal across groups and the fit indices suggest presence of strong (scalar) invariance.

Invariance Testing Conclusions

The three types of invariance results (indices for model fit) were examined in drawing conclusion of measurement equivalence (see Table 23). In measurement equivalence, fit indices should remain constant or have negligible changes as each level when constraints are imposed on the model. The *chi-square* was not recommended to examine across invariance analyses results as it tended to be sensitive to changes in constraints placed on the models.

Recommendations regarding evaluating for invariance when examining all invariance analyses results were integrated into the overall conclusions and were derived from Little (2013). When examining the weak and strong invariance, the constraints placed demonstrated that all

indicators' factor loadings and intercepts were able to achieve equivalence. Little (2013) recommended Cheung and Rensvold guideline regarding evaluating change in CFI values across invariance testing models. Changes across *CFI* were ≤ .01, the conclusion of measurement equivalence (invariance) were supported. Based on the fit indices of each invariance testing method, ability to constrain mathematical equivalence to the factor loadings and intercepts (weak and strong invariance testing), negligible changes of fit indices from model to model, and *CFI* changes were ≤ .01, the PES-NWI was concluded to have measurement equivalence (invariance). This may be interpreted as construct comparability.

Table 23

Fit Indices by Group and Invariance Models

Model	χ^2	χ^2 *DF*	χ^2 *p*	χ^2 WNH Contribution	χ^2 API Contribution	*RMSEA*	*RMSEA 90% CI*	*CFI*	*TLI*	*SRMR*
RNs-API	7808.559	424	< .001			0.068	0.066-0.069	0.907	0.898	0.043
RNs-WNH	19375.623	424	< .001			0.065	0.065-0.066	0.903	0.893	0.045
Fixed Factor Variance Method of Scaling										
Configural (Equal Form) Model	27184.181	848	< .001	19375.623	7808.559	0.066	0.065-0.067	0.904	0.895	0.044
Weak (Metric) Model	27296.121	874	< .001	19408.978	7887.144	0.065	.064-.066	0.904	0.897	0.045
Strong (Scalar) Model	28388.511	900	< .001	19742.608	8645.903	0.065	.065-.066	0.9	0.896	0.047
Marked Indicator Method of Scaling										
Configural (Equal Form) Model	27184.181	848	< .001	19375.623	7808.559	0.066	0.065-0.067	0.904	0.895	0.044
Weak (Metric) Model	27296.121	874	< .001	19408.979	7887.142	0.065	.064-.066	0.904	0.897	0.045
Strong (Scalar) Model	28388.511	900	< .001	19742.617	8645.894	0.065	.065-.066	0.900	0.896	0.047

Note. API = Asian/Pacific Islander; WNH = White/Non-Hispanic

Validity Testing (Research Question 3)

Validity testing for the PES-NWI was undertaken within groups. The intent was to determine if the PES-NWI was valid in each group. Following Lake's (2002) process, validity was tested by determining if the subscale means differed between Magnet®-designated hospitals and non-magnet hospitals, but this study tested differences at the individual level. The means of the subscales for Magnet®-designated hospitals were greater than non-magnet hospitals as to be expected (see Table 24). Differences in the means of subscales by Magnet® versus non-magnet

hospital within groups (RNs-API and RNs-WNH) were analyzed using independent *t*-testing (see Table 24). Statistically significant mean differences were noted in all subscales for RNs-WNH and the PES-NWI was found to be valid in this group. All but two subscale means were found to be statistically significant for RNs-API. The two subscale means found not to have statistically significant mean differences were Hospital Affairs (p = .091) and Nurse Manager (p = .513). Although two of the subscale means were not statistically significant, the PES-NWI demonstrated validity in the RNs-API group but should be treated with caution regarding Hospital Affairs and Nurse Manager.

Table 24

Independent t-test for Factor Scale Means for the Practice Environment Scale-Nursing Work Index (PES-NWI) by Groups

	RNs-API (n = 3,806)		RNs-WNH (n = 10,452)		RNs-API (n = 3,806)		RNs-WNH (n = 10,452)	
Factor Scale Means	*n*	*M (SD)*	*n*	*M (SD)*	*D*	*t* (p)	*d*	*t* (*p*)
StaffRes:					.091	-2.766 (.006)	.132	-6.722 (< .001)
Magnet®	1687	2.832 (.657)	4385	2.718 (.680)				
Non-magnet	2119	2.772 (.658)	6067	2.628 (.674)				
HospAff:					.055	-1.691 (.091)	.201	-10.159 (< .001)
Magnet®	1687	2.992 (.539)	4385	2.932 (.558)				
Non-magnet	2119	2.962 (.546)	6067	2.820 (.555)				
QualCare:					.127	-3.947 (< .001)	.212	-10.698 (< .001)
Magnet®	1687	3.226 (.430)	4385	3.168 (.436)				
Non-magnet	2119	3.170 (.447)	6067	3.075 (.441)				
NursMana:					.021	-.654 (.513)	.118	-5.969 (< .001)
Magnet®	1687	3.083 (.613)	4385	3.040 (.666)				
Non-magnet	2119	3.070 (.613)	6067	2.960 (.683)				
NursPhy					.072	-2.271 (.023)	.132	-6.639 (< .001)
Magnet®	1687	3.089 (.518)	4385	3.073 (.567)				
Non-magnet	2119	3.050 (.551)	6067	2.998 (.565)				

Note. API = Asian/Pacific Islander; WNH=White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare = Quality Care; NursMana= Nurse Manager; NursPhy= Nurse Physician; *d* = Cohen's D

Conclusion

In Chapter IV, results for the secondary analysis of the PES-NWI were provided. The results consisted of indicators' statistical description, single group CFA, multiple-group CFA for invariance testing, and validity testing using independent t-test analysis. RNs-API used the indicator responses "strongly disagree" and "disagree" less than RNs-WNH. Using CFA, the five factor model fit the data adequately for both groups. When examining the invariance testing results, it was determined that the PES-NWI demonstrated measurement equivalence (measurement invariance). Results for the *t*-tests support the validity of the PES-NWI in both groups; however, caution must be taken when interpreting subscales that were not statistically significant (Nurse Participation in Hospital Affairs and Nurse Manager Ability, Leadership, and Supportive Nurses) for RNs-API.

Chapter V

Discussion, Conclusions, and Recommendations

In this chapter, I discuss the findings guided by the study aim, research study questions, theoretical framework, and the review of literature. The aim of this study was to determine the cultural measurement equivalence (CME) of the Practice Environment Scale–Nursing Work Index (PES-NWI) using two racial and/or ethnic groups (i.e., White/Non-Hispanic and Asian/Pacific Islander) within a large sample of nurses across the U.S. who participated in the NDNQI®; and thus, determine if construct validity of the instrument would be consistent in both groups (see Figure 1, p. 9). The following research questions were addressed:

1. Are there differing item response styles to the PES-NWI across the two groups— White/Non-Hispanic (RNs-WNH) and Asian/Pacific Islander (RNs-API)?
2. Is there measurement equivalence of the PES-NWI between two groups— RNs-WNH and RNs-API (see Figure 1)?
3. Are there mean subscale score differences for the PES-NWI between RNs working in Magnet® hospitals versus non-magnet hospitals within each group— RNs-WNH and RNs-API?

Schwartz's Theory of Basic Values framework integrates the aspects of individualism and collectivism. This paradigm is threaded through the discussion of results.

Significance of the Study

The nursing workforce is becoming more diverse due to increased recruitment of nurses outside the U.S., pending U.S. immigration reform, and the influx of individuals of Latin origin entering the United States. There is a need to have survey instruments with measurement equivalence (invariance) across cultures when studying large samples such as the nursing workforce. Liou and Cheng (2008) identified that although the majority of nurses recruited from

Asian areas tend to be from the Philippines, Korea, and India. Steps are needed to recognize cultural diversity as there may be differing needs, perceptions of work environment, understanding levels of autonomy, and commitment to employers.

Determining reliability, invariance, and validity of instruments used across cultures enables the pooling of results thereby aiding in guiding changes to improve patient and nursing sensitive outcomes. This would dispel concerns that minority group responses are overshadowed by the majority group. Furthermore, this also allows for cross cultural comparison to learn from other cultures as well as identify unique needs of differing cultures.

This is the first study examining the measurement equivalence of the PES-NWI in a large dataset reflecting the nursing workforce across U.S. using a case matching method. Although the RNs-API non-case match group was older than RNs-API case match group, all other characteristics were small to negligibly different in magnitude across the combination groups (see Table 9, 10, and 11). The case match group was an adequate representation of the non-matched group.

There has been interest in determining measurement invariance of the PES-NWI by other researchers (Bruyneel, Li, Squires, Spotbeen, Meuleman, Lesaffre, & Sermus, 2014). The objective of their study was to determine measurement invariance of a translated version of the PES-NWI (French and Dutch) between nurse mangers and staff nurses using Bayesian multilevel, multiple indicators and multiple causes (MIMIC) modeling. Although this an alternative use of the PES-NWI, Lake (2002) derived the scale from a previously developed instrument, Nursing Work Index (Kramer & Hafner, 1989). Both instruments were developed based on nursing shortage and retention issues in the U.S. (Lake, 2002; Kramer & Hafner, 1989). Lake's (2002) primary goal was to measure the practice environment's influence on nurses and patient outcomes.

There also have been a few studies published in nursing regarding measurement invariance testing in other measurement tools. For example, investigators have examined instruments regarding asthma (Sousa, West, Moser, Harris, & Cook, 2012), evidence-based practice integration (Sese-Abad, De Pedro-Gomez, Bennasar-Veny, Sastre, Fernandez-Dominguez, & Morales-Ascencio, 2014), strain experienced in working women (Beckstead, Yang, & Lengacher, 2008), and patient satisfaction (Mark & Wan, 2005). This study will add further knowledge on the use of the PES-NWI in the U.S. while substantiating the importance of invariance testing across different ethnic/racial groups.

Discussion of Results

Sample Description

The examination of the sample was conducted by examining descriptive statistics such as percentages, means, histograms, chi-square, and independent t-tests. In this study, there were 14,258 registered nurses (RNs) that responded to the PES-NWI. Approximately 27% (n = 3,806) of the sample self-reported as Asian/Pacific Islanders (RNs-API). Case match method (nursing unit type, age, years of practice as an RN in the U.S., work shift, and education level) was used. The majority of RNs self-reported as female in each group. The proportions of RNs in each group were similar across groups in the reporting of the highest level of nursing license (RN vs. Advanced Practice Registered Nurses [APRN]).

When compared to RNs-WNH, RNs-API were older, had more experience (tenure) on their current nursing unit, and had more years practicing as a RN (years of work equivalent to a registered nurse prior to entering US and years of practice after migrating to the US). The older age of the RN-API also was reflected in the response regarding job plans for next year as there was a larger proportion of RNs-API reporting they would be retiring when compared to RNs-WNH.

Work Characteristics

The proportions of RNs in each group were similar across groups in the reporting of job status PRN (as needed) and working non rotating, day/night, and day/evening/night shifts. There also were similar percentages of job plans for next year for the following: transferring to another unit to provide direct patient care in the same hospital, leaving direct care but staying in nursing, or leaving nursing altogether.

A larger proportion of RNs-API worked full-time while a larger proportion of RNs-WNH worked part-time. It is possible that 36.5% of RNs-API migrating from other countries were recruited to work in acute care facilities with a condition to work full-time. RNs choosing to work part-time may be due to the need to meet family obligations, wanting a balance between a personal and work like (individualistic characteristic), avoiding burn-out, or returning to school.

The largest proportion of RNs in both groups reported working in critical care adult units. However, the proportion size was greater in RNs-WNH while a large proportion of RNs-API worked in all other nursing units (step down adult, medical adult, surgical adult, and medical-surgical adult) under study.

When compared to RNs-WNH, a larger percentage of RNs-API tended to work evening and night shifts, which would also include taking rotating shifts between evening and nights. Lin's (2009) synthesis of literature of Asian nurses' work experiences found that these nurses tended to be flexible in their work schedules by willingness to work overtime, weekends, and night shifts.

It also was noted by proportion that RNs-API were more likely to stay in their current job than RNs-WNH. This characteristic has been recognized by hospitals as a benefit (Brush, Sochalski, & Berger, 2004; Lin, 2009), and therefore hospitals are more willing to incur the financial cost of migrating nurses from Asia and the Pacific Islands. The desirable quality of

nurse retention may have enhanced the development of recruitment centers in the Philippines and India (Brush et al., 2004). This quality may be due to the collectivist characteristic (Lin, 2009) that was substantiated in a study by Cheng and Liou (2011) who identified a significant negative relationship between collectivism and intent to leave when studying Asian nurses working in US hospitals. However, retention may be influenced by contractual agreements between the hiring facility and the nurse to work for a specified number of years (Brush et al., 2004).

Nurses' Education

Although RNs-WNH tended to have a higher proportion reporting their highest level of education as a baccalaureate degree, it is noteworthy that there was a higher proportion of RNs-API with a master's degree and/or holding a specialty certification when compared to RNs-WNH. This partly may be explained by nurses recruited from different countries with contracts that include benefits to support obtaining a nursing master's degree from a school in the U.S. (Brush, Sochalski, & Berger, 2004). Seago and Spetz (2008) research study of minority nurses' (that included Asian Pacific American and Filipino) experiences working at their nursing jobs found that minority nurses with associate degrees were more likely to pursue advance education or certifications in their nursing discipline. In this current study, there was a higher proportion of RNs-API reporting an associate degree as their highest degree when compared to RNs-WNH.

RNs-API (n = 1,357) who reported receiving their basic RN education outside of the United States primarily reported countries such as Philippines (71%) or India (21%). This is to be expected as the majority of nurses from other countries, whether Asian/Pacific Islander or White/Non-Hispanic, primarily came from the Philippines followed by India, Korea (Liou & Cheng, 2008), United Kingdom, or Nigeria (Brush, Sochalski, & Berger, 2004). A greater percentage of RNs-WNH that obtained their basic RN education outside U.S. reported receiving it in Canada, followed by Poland and the United Kingdom.

Hospital Characteristics

The proportions of RNs in each group were similar across groups in the reporting of working in hospitals with bed sizes ≥ 500 and in not-for-profit, government-nonfederal, and for profit investor owned hospitals. The majority of RNs worked in hospitals with bedsizes of 200-299, however, a larger proportion of RNs-API worked in that size hospital when compared to RNs-WNH. There was a larger percentage of RNs-API working in government-federal hospitals than RNs-WNH. In addition, the proportion of RNs-API working in academic medical centers and non-teaching hospitals was larger than RNs-WNH, while a greater percentage of RNs-WNH worked in teaching hospitals. This may be due to academic medical centers and non-teaching hospitals are more likely to recruit nurses from outside U.S. than teaching hospitals. There was a smaller proportion of RNs-WNH working in Magnet®-designated hospitals than RNs-API. This could be explained by more RNs-API working in academic medical centers and non-teaching hospitals. Those hospital types are more likely seek Magnet® designation.

Results for Research Question 1: Item Response Characteristics for the PES-NWI

Several actions were taken in determining if there were differences in response styles between RNs-API and RNs-WNH. Descriptive statistics (e.g. mean, median, mode, SD, skewness, kurtosis, percentage within each response, percentage of missing responses, and response range) of each indicator within each group were examined. There were noted similarities between groups. All indicators in both groups had < 5% missing data, had a value of three for the median and mode, negative skew, and all response ranges were used (strongly disagree to strongly agree). The middle responses, "disagree and agree" were commonly used for the indicators within the latent factor "Staffing and resource adequacy (StaffRes)" in both groups. Both groups used the positive responses, "agree and strongly agree" more often for the indicators within the latent factors, "Nursing foundations for quality care (QualCare), Nurse

manager ability, leadership, and supportive nurses (NursMana), and Collegial nurse physician relations (NursPhy)". Wide use of responses, "disagree, agree, and strongly agree" tended to occur in the indicators under the latent factor, "Nurse participation in hospital affairs (HospAff)" for both groups. When comparing differences (use of χ^2 results) of indicator responses between RNs-API and RNs-WNH, there was only one item noted to have similar response proportions between groups, "A preceptor program for newly hired RNs (QC6)". This may be due to the item not requiring a level of perception to respond but rather a factual response (preceptor program present or not present).

RNs-API tended to use the negative responses (strongly disagree and disagree) less than RNs-WNH when comparing response proportions. A greater proportion of RNs-API tended to respond favorably (agree and strongly agree) when compared to RNs-WNH which may also be explained by the collectivist orientation of the respondents. In a study by Chen and Liou (2011) using the PES-NWI, there was positive association between collectivism and perception of the practice environment. Liou, Tsai, and Cheng (2013) identified that first generation immigrants from the Philippines or Asian countries retained the collectivistic traits when measured with the Collectivist Orientation Scale (α = .71).

The majority of all indicator means in the RNs-API group were higher than the RNs-WNH with the exception of "Staff nurses have the opportunity to serve on hospital and nursing committees (HA8) and "Working with nurses who are clinically competent (QC4)". However, the differences between the means were negligible. It was also noted that as the mean per indicators became more distant from each other the kurtosis tended to have opposite values (positive vs. negative).

Response styles such as extreme and excess use of middle response were not noted in this study. Of note, this instrument had a 4-point Likert-style response scale forcing participants to

make a decision rather than choosing a neutral response. Overall, it is clear in this study that RNs-API tended to respond more positively than RNs-WNH.

Results for Research Question 2: Single/Group Confirmatory Factor Analysis

Prior to testing for measurement invariance, CFA was conducted on each group (RNs-API and RNs-WNH) to ensure that the model fits the data before proceeding. In both groups, the covariance matrix demonstrated a positive relationship while the correlation matrix demonstrated that majority of all items in their latent factor had moderate to strong correlations (positive). However, Lake (2002) conducted a varimax rotation during the exploratory factor analysis with the assumption that latent factors were not correlated. In this study, there was notable moderate to strong positive correlation between items outside their latent factors. The majority of cross-correlations occurred in the latent factors "Nurse participation in hospital affairs (HospAff), Nursing foundations for quality care (QualCare), and Nurse manager ability, leadership, and supportive nurses (NursMana). This may be a partial explanation as to why the goodness-of-fit indices may not have very strong values (strong model fit vs. adequate model fit). In addition, the latent factors were allowed to be correlated which may explain correlation of indicators to other latent factors.

Values of factor loadings between both groups were similar. There were two factor loadings that had the greatest difference between groups, "Written, up-to-date nursing care plans for all patients (QC8)" and "Use of nursing diagnoses (QC10)". The factor loadings were higher in the RNs-API group.

After examining the results for the confirmatory factor analysis results in each group, it was determined that there was adequate model fit. The results did not support a strong model fit or a poor model fit. The goodness-of-fit indices were very similar across the two groups (see

Table 23). Identifying adequate model fit in both groups allowed for the progression to invariance testing.

Changes in the Practice Environment

Changes have occurred in the nursing practice environment as well in the perception of the work environment since the development of the PES-NWI by Lake (2002). These changes may have altered the overall strength of the PES-NWI as an instrument to measure practice environment perceptions. The dramatic change in the integration of technology in the care of patients may have altered the relationship between nurses and patients as well as how nurses perceive the practice environment (Buckner & Gregory, 2011). The Institute of Medicine (IOM) has affected many healthcare environments to focus on outcomes and quality of care which influenced many processes in these environments to change and incorporate a more interprofessional collaborative approach to attaining the best possible patient outcome (Gross, 2013). In addition, there is increased recognition that different nursing unit types have differing work environment perceptions (Choi & Boyle, 2014); a paradigm of a one-size-fits-all intervention to improve the work environment may not be reasonable.

Invariance Testing

Invariance testing was undertaken to determine measurement equivalence of the PES-NWI across two cultural groups (RNs-API and RNs-WNH). Models with constraints were applied in a step-wise fashion which consisted of configural (equal form), weak (metric) invariance, and strong (scalar) invariance. The inductive approach was used as it would provide greater ease in determining which areas of the results would have contributed to a final conclusion of partial invariance (Brown, 2015).

Two methods of scaling were used to evaluate measurement invariance when testing the three model types. The first method of scaling allowed the first indicator of each factor to be the

marker indicator and the second method allowed the first indicator to be freely estimated while fixing the variances of the latent factors to a value of 1. The marked indicator method of scaling was first selected for ease in determining if analyses followed the Mplus code written then followed by fixed variance method of scaling to validate results. Per Brown (2015), one issue with marked indicator method of scaling is that noninvariant marker indicators would be difficult to identify when the indicator factor loading is fixed to 1. This may then affect all other factor loadings leading to bias in the results. In this study, this increased the values of unstandardized factor loading to > than 1 which may decrease the ease of interpretation. One positive aspect of this method allows for the factor variance to be freely estimated. The second method of scaling allows all indicators to be freely estimated and fixing the variance to one. This would uncover hidden noninvariance but does not allow the latent factor variance to be freely estimated.

The PES-NWI resulted in having measurement equivalence between RNs-API and RNs-WNH. This is synonymous as measurement invariance that is interpreted as construct comparability between RNs-API and RNs-WNH. Based on Little (2013) recommendations, strong invariance holds as evidence by constraining the items' factor loading and intercepts. When comparing results of configural (equal), metric, and scalar model results, values were negligibly different, in addition, the results were similar to the single group (RNs-API and RNs-WNH) CFA results (see Table 23). The results of the fit indices were almost exactly the same when comparing across the two different methods of scaling, which was to be expected (Little, 2013).

Results for Research Question 3: Validity Testing

The independent t-testing of the Magnet® versus non-magnet group in the RNs-API group, showed the majority of subscales have statistically significant mean differences except for "Nurse Participation in Hospital Affairs" (HospAff) and "Nurse Manager Ability, Leadership, and Supportive Nurses" (NursMana). The common thread between the two subscales is that both address supervisor/administrator characteristics. It is possible that from a collectivist perspective, the respect of hierarchy (Lin, 2009; Liou & Cheng, 2008; Melby, Dodgson, & Tarrant, 2008; Yu, 2008) and loyalty to the employing organization is important within the RNs-API sample which may have contributed to the higher mean scores than the RNs-WNH sample. In addition, the respect for hierarchy may have transcended diverse work environments, Magnet status or not.

Indicator means for Hospital Affairs items, "(HA1) Career development/clinical ladder opportunity" and "(HA5) Administration that listens and responds to employee concerns", supports results by Seago and Spetz (2008). In the study by Seago and Spetz, nurses reporting Filipino as their race were more likely to perceive there was opportunity for advancement than RNs reporting Caucasian. The indicator means (HA1 and HA5) were higher in RNs-API than RNs-WNH. However Seago and Spetz reported the RNs (from the Philippines) were more likely to report there were barriers to advancement, commonly reporting favoritism and race as reason for not being promoted. RNs reporting as Caucasian perceived favoritism and other reasons, not necessarily race as being barriers to promotions. These perceptions and experiences may also transcend diverse work environments whether these work sites had Magnet® designation or not. This also may explain a component of non-statistical differences in the latent factors Hospital Affairs and Nurse Manager.

There were two indicator means noted to be low in the latent factor "Nurse participation in hospital affairs (HA)" ($\mu < 3$) in both groups. In the RNs-API group, the indicators were

"(HA6) Administration that listen and responds to employee concerns (μ=2.83, *SD* = .772)" and "(HA9) Nursing administrators consult with staff on daily problems and procedures (μ=2.86, *SD* =.757)". Language barrier may be a factor in explaining these results. Although nurses recruited from Asian, Pacific Islands are required to have a level of fluency in the English language; there still may be a barrier in spoken and body language (Liou & Cheng, 2008). Steps should be taken to help alleviate these barriers to avoid breakdown in communication and potentially improving the mean scores.

The PES-NWI was found to be valid in the RNs-WNH as well as the majority of subscales for the RNs-API. It was expected that the Magnet® group mean sub-scales would be higher in value than non-magnet group mean subscales. The PES-NWI was derived from data regarding the original Magnet® hospitals and the majority of subscales being measured are threaded in the Magnet® model and the forces of magnetism. When cross comparing results, caution must be taken when interpreting results for the subscales (Hospital Affairs and Nurse Manager) that were not significant. It should be noted that Lake (2002) aggregated the individual results to the hospital then tested for difference between Magnet®-designated hospitals and non-magnet hospitals. In this study, validity was tested at individual level and not aggregated to the hospital level. Yet it is worth mentioning that there were statically significant differences in perceptions of the practice environment subscales at the individual level. In addition, previous studies (Chiang & Lin, 2008; Liou & Cheng, 2009) examining the PES-NWI in nurses reporting Asian/Pacific Islanders results led to altering the subscales "Nurse participation in hospital affairs" and "Nurse manager ability, leadership, and supportive nurses". Items from the PES-NWI were moved to another factor or a new factor was developed. See Table 3 for further information.

Strengths and Limitations

Sample size was a strength in this this study. Post-hoc power analysis was 100% in all tests. The National Database of Nursing Quality Indicators® (NDNQI®) repository served as an ideal database when needing to conduct analyses with large, diverse sample sizes. Matching participants by characteristics aided in decreasing bias as well as variance which has the potential of affecting invariance testing results. Matching participants decreases sample size in each group, however, the NDNQI® secondary dataset was able to accommodate this issue. In addition, sample size was able to be retained despite missing data through the use of Mplus (avoids list-wise deletion).

An additional strength in this study was the use of multi-group confirmatory factor analysis (CFA) for invariance testing versus exploratory factor analysis (EFA). CFA is able to test a specified model whereas EFA is intended to uncover latent factors. Data for each group can be analyzed simultaneously when evaluating for measurement invariance. CFA has less subjectivity than EFA and EFA does not lend itself to measurement invariance testing, therefore preventing cross-cultural comparisons.

There are limitations noted in this study. Strict invariance testing was not conducted in this study (some may assume it provides better evidence) because is not generally recommended (Little, 2013). Strict invariance would constrain the indicator residuals to be equal. This would remove uniqueness by assuming indicator specific variance and random error would be the same across groups which would not be ideal when evaluating constructs across groups.

Participants could have been case-matched by variables such as hospital size or gender, however, the more variables used for matching the smaller the sample size. This study pooled participants together such as male and female or RNs-API receiving basic RN education within and outside the U.S. There would be a need to conduct further invariance testing to ensure

measurement equivalence exist in these groups. This study used unequal group sizes when testing for invariance. This leads to a difference in χ^2 contributions between both groups which must be taken into consideration when evaluating for overall invariance.

Guidelines regarding the determination of invariance are just guidelines. Further knowledge is needed regarding invariance statistical guidelines which are still relatively understudied. There is a need for further research in developing knowledge regarding what constitutes a lack of invariance.

Recommendations and Conclusion

This study demonstrated that RNs-API responded more positively to the PES-NWI than RNs-WNH. There was noted adequate model fit of the PES-NWI within each group (RNs-API and RNs-WNH) and demonstrated measurement equivalence between the two groups. PES-NWI also was found to be a valid instrument in both groups (caution must be taken when interpreting results in the RNs-API group). Due to evidence of presence of strong invariance between the two groups and overall validity of the instrument, the study demonstrated cultural measurement equivalence of the PES-NWI between RNs-WNH and RNs-API. These two groups can be pooled to represent the nursing workforce and cross cultural comparability may be conducted.

For future research considerations, using the entire sample for invariance testing is needed, as opposed to a case-matched sample. Longitudinal CFA may be of interest in examining the stability of the PES-NWI over time which may provide insight regarding construct changes or changes in the meaning of the construct while identifying areas needing modification. It would be beneficial to update this instrument considering when it was first formally specified by Lake (2002) as many changes would be expected more than a decade later. Invariance and validity testing should be repeated once modification of the PES-NWI has been

completed. Issues may arise where the specification of the model may improve while no longer having measurement equivalence (invariance) across cultural groups.

Examining measurement equivalence of the PES-NWI across diverse cultural groups allows for cross comparison of each group while identifying the uniqueness (Lin, 2009) of each group. The method of determining measurement equivalence of the PES-NWI should expand to other races/ethnicities such as RNs reporting their status as African American, Hispanic/Latino, and American Indian. Further exploration in measurement invariance testing within RNs-API receiving their basic education in the U.S. versus outside of the U.S. may provide additional information. Measurement equivalence of the PES-NWI between genders should be considered as the percentage of male RNs is increasing.

Further exploration in case matching should be considered between the group of interest and the reference group. However, sample size may decrease if increasing the number of variables to case match. Case matching by shift, years of practice, and job status may be beneficial as the variables have the potential to influence perception of the working environment.

The nursing workforce will increase in diversity with the passing of time. It would be beneficial for instruments used in large samples to have measurement equivalence allowing for safe pooling of results while providing data reflecting perceptions of the practice environment not heavily influenced by individual characteristics but rather the perception of the nursing workforce. This work contributes additional information on the PES-NWI as well as on the RNs-API group. Further research is needed in the various race/ethnicity groups and gender invariance testing while examining characteristics in each group.

References

Aiken, L. H., & Patrician, P. A. (2000). Measuring organizational traits of hospitals: The Revised Nursing Work Index. *Nursing Research, 49*, 146-153.

American Nurses Association (2014). The National Database. Retrieved August, 2014. http://www.nursingworld.org/MainMenuCategories/ThePracticeofProfessionalNursing/PatientSafetyQuality/Research-Measurement/The-National-Database

Auerbach, D. I., Staiger, D. O., Muench, U., & Buerhaus, P. I. (2012). The nursing workforce: A comparison of three national surveys. *Nursing Economics, 30*, 253-261.

Bardi, A. & Schwartz, S. H. (2003). Values and behavior: Strength and structure of relations. *Personality and Social Psychology Bulletin, 29*, 1207-1220. doi: 10.1177/0146167203254602

Beckstead, J. W., Yang, C., & Lengacher, C. A. (2008). Assessing cross-cultural validity of scales: A methodological review and illustrative example. International *Journal of Nursing Studies, 45*, 110-119. doi: 10.1016/j.ijnurstu.2006.09.002.

Brown, T. A. (2015). CFA with equality constraints, multiple groups, and mean structures. *Confirmatory Factor Analysis for Applied Research*. New York: Guilford Press.

Brush, B. L., Sochalski, J., & Berger, A. M. (2004). Imported care: Recruiting foreign nurses to U.S. health care facilities. *Health Affairs, 23*, 78-87. doi: 10.1377/hltlaff.23.3.78.

Buchan, J. (1999). Still attractive after all these years? Magnet hospitals in a changing health care environment. *Journal of Advanced Nursing, 30*, 108.

Bruyneel, L., Li, B., Squires, A., Spotbeen, S., Meuleman, B., Lesaffre, E., & Sermus, W. (2014). Bayesian multilevel MIMIC modeling for studying measurement invariance in cross-group comparisons. *Medical Care*, e-pub before print.

Buckner, M. & Gregory, D. D. (2011). Point-of care technology: Preserving the caring environment. *Critical Care Nursing Quarterly, 34*, 297-305. doi: 10.1097/CNQ.0b013e31822bac0e

Castle, J. E. (2003). Maximizing research opportunities: Secondary Data Analysis. *Journal of Neuroscience Nursing, 35*, 287-290.

Chen, C., Lee, S., & Stevenson, H. W. (1995). Response style and cross-cultural comparisons of rating scales among East Asian and North American students. *Psychological Science, 6*, 170-175.

Cheng, C. & Liou, S. (2011). Intention to leave of Asian nurses in US hospitals: does cultural orientation matter? *Journal of Clinical Nursing, 20*, 2033-2042.

Chiang, H., & Lin, S. (2008). Psychometric testing of the Chinese version of nursing Practice Environment Scale. *Journal of Clinical Nursing, 18*, 919-929. doi: 10.1111/j.1365-2702.2008.02433.x

Choi, J. & Boyle, D. K. (2014). Differences in nursing practice environment among US acute care unit types: A descriptive study. *International Journal of Nursing Studies, 51*, 1441-1449. doi: 10.1016/j.ijmurstu.2014.03.001

Cronbach, L. J. & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*, 281-302.

Cukur, C. S., De Guzman, M. R. T., & Carlo, G. (2004). Religiosity, values, and horizontal and vertical individualism-collectivism: A study of Turkey, the United States, and the Philippines. *The Journal of Social Psychology, 144*, 613-634. doi: 10.3200/SOCP.144.6.613-634

Davidov, E., Schmidt, P., & Schwartz, S. H. (2008). Bringing values back in: The adequacy of the European Social Survey to measure values in 20 countries. *Public Opinion Quarterly, 72*, 420-445. doi: 10.1093/poq/nfn035

Devos, T., Spini, D., & Schwartz, S. H. (2002). Conflicts among human values and trust in institutions. *British Journal of Social Psychology, 41*, 481-494.

Dunckley, M., Hughes, R., Addington-Hall, J. M., & Higginson, I. J., 2003. Translating clinical tools in nursing practice. *Journal of Advance Nursing, 44*, 420-426.

Flaskerud, J. H. (1988). Is the Likert scale format culturally biased? *Nursing Research, 37*, 185-186.

Flaskerud, J. H. (2012). Cultural bias and Likert-type scales revisted. *Issues in Mental Health Nursing, 33*, 130-132. doi: 10.3109/01612840.2011.600510.

Foronda, C. L. (2008). A concept analysis of cultural sensitivity. *Journal of Transcultural Nursing, 19*, 207-212. doi: 10.1177/1043659608317093.

Gabriel, A. S., Erickson, R. J., Moran, C. M., Diefendorff, J. M., & Bromley G. E. (2013). A multilevel analysis of the effects of the Practice Environment Scale of the Nursing Work Index on nurse outcomes. *Research in Nursing & Health, 36*, 567-581. doi: 10.1002/nur.21562

Gajewski, B. J., Boyle, D. K., Miller, P. A., Oberhelman, F. & Dunton N. (2010). A multilevel confirmatory factor analysis of the Practice Environment Scale: A case study. *Nursing Research, 59,* 147-153. doi: 10.1097/NNR.0b013e3181d1a71e

Grimm, S. D., & Church, A. T. (1999). A cross-cultural study of response biases in personality measures. *Journal of Research in Personality, 33*, 415-451.

Gross, A. H. (2013). Quality care: Where we came from and where we must go. *Clinical Journal of Oncology Nursing, 17*, 236-238. doi: 10.118/13.CJON.236-238

Hamamura, T. (2012). Are cultures becoming individualistic? A cross-temporal comparison of individualism-collectivism in the United States and Japan. *Personality and Social Psychology Review, 16*, 3-24. doi: 10.1177/1088868311411587

Harzing, A. (2006). Response styles in cross-national survey research: A 26-country study. *International Journal of Cross Cultural Management, 6,* 243-266. doi: 10.1177/1470595806066332

Havens, D. S., Warshawsky, N., & Vasey, J. (2012). The nursing practice environment in rural hospitals. *The Journal of Nursing Administration, 42*, 519-525. doi: 10.1097/NNA.0b013e3182714506

Health Resources and Services Administration (2010). *The registered nurse population: Findings from the March 2008 National Sample Survey of Registered Nurses*. U.S. Department of Health and Human Services. Retrieved from http://bhpr.hrsa.gov/healthworkforce/rnsurveys/rnsurveyfinal.pdf

Hitlin, S. (2003). Values as the core of personal identity: Drawing links between two theories of self. *Social Psychology Quarterly, 66*, 118-137.

Hoeffel, E. M., Rastogi, S., Kim, M. O., & Shahid, H. (2012). The Asian Population: 2010. *2010 Census Briefs.* C2010BR-11. http://www.census.gov/prod/cen2010/briefs/c2010br-11.pdf

Homans, G. C. (1958). Social behavior as exchange. *American Journal of Sociology, 63,* 597-606.

Hsueh, K. H., Phillips, L. R., Cheng, W., & Picot, S. J. (2005). Assessing cross-cultural equivalence through confirmatory factor analysis. *Western Journal of Nursing Research, 27*, 755-771. doi: 10.1177/0193945905276585.

Institute of Medicine (2003). Keeping patients safe: Transforming the work environment of nurses. *Quality Chasm Series*. Washington DC: The National Academies Press.

John, O. P., & Benet-Martinez, V. (2000). Measurement: Reliability, construct validation, and scale construction. In *Handbook of Research Methods in Social and Personality Psychology* (pp. 339-369). New York: Cambridge University Press.

Johnson, T., Kulesa, P., Llc, I., Cho, Y. I., & Shavitt, S. (2005). The relation between culture and response styles: Evidence from 19 countries. *Journal of Cross-Cultural Psychology, 36*, 264-277. doi: 10.117/0022022104272905

Kam, C., Schermer, J. A., Harris, J., & Vernon, P. A. (2013). Heritability of acquiescence bias and item keying response style associated with the HEXACO Personality Scale. *Twin Research and Human Genetics, 4,* 790-798. doi:10.1017/thg.2013.38

Kimberlin, C. L. & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy, 65*, 2276-2284. doi: 10.2146/ajhp070364

Knafo, A. & Sagiv, L. (2004). Values and work environment: Mapping 32 occupations. *European Journal of Psychology of Education, 19*, 255-273.

Kramer, M., & Hafner, L. (1989). Shared values: Impact on staff nurse job satisfaction and perceived productivity. *Nursing Research, 38,* 172-177.

Lai, W., Chao, C. C., Yang, W., Liu, H., & Chen, C. (2013). "Does one size fit all?": Exploring the cultural applicability of NANDA nursing diagnoses to Chinese nursing practice. *Journal of Transcultural Nursing, 24,* 43-50. doi: 10.1177/1043659612462462403

Lake, E. T. (2002). Development of the Practice Environment Scale of the Nursing Work Index. *Research in Nursing & Health, 25*, 176-188. doi: 10.1002/nur.10032

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology, 22*, 1-55.

Likert, R., Roslow, S., & Murphy, G. (1934). A simple and reliable method of scoring the Thurstone Attitude Scales. *Journal of Social Psychology, 5*, 228-238.

Lin, L. (2009). A synthesis of the literature on Asian nurses' work experiences in the United States. *Research and Theory for Nursing Practice: An International Journal, 23*, 230-245. doi: 10.1891/1541-6577.23.3.230.

Liou, S., & Cheng, C. (2009). Using the Practice Environment Scale of the Nursing Work Index on Asian nurses. *Nursing Research, 58,* 218-225.

Liou, S. & Cheng, C. C. (2008). Building organizational commitment of Asian nurses in the United States. *Journal of Nursing Administration, 38*, 8-10.

Liou, S., Tsai, H. & Cheng, C. (2013). Acculturation, collectivist orientation and organizational commitment among Asian nurses working in the US healthcare system. *Journal of Nursing Management, 21,* 614-623. doi: 10.1111/j.1365-2834.2012.01447

Little, T. D. (2013). Longitudinal CFA model. Longitudinal Structural Equation Modeling (pp. 137-179. New York: Guilford Press.

Liu, C., Borg, I., & Spector, P. E. (2004). Measurement equivalence of the German Job Satisfaction Survey used in a multinational organization: Implications of Schwartz's Culture Model. *Journal of Applied Psychology, 89,* 1070-1082. doi: 10.1037/0021-9010.89.6.1070

Lyons, S. T., Duxbury, L. E., & Higgins, C. A. (2006). A comparison of the values and commitment of private sector, public sector, and parapublic sector employees. *Public Administration Review, 66,* 605-618.

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods, 4*, 84-99.

Mark, B. A. & Wan, T. T. H. (2005). Testing measurement equivalence in a patient satisfaction instrument. *Western Journal of Nursing Research, 27*, 772-787. doi: 10.1177/0193945905276336.

Melby, C. S., Dodgson, J. E., Tarrant, M. (2008). The experiences of western expatriate nursing educators teaching in Eastern Asia. *Journal of Nursing Scholarship, 40,* 176-183.

Mercer, C., & Durham, T. W (2001). The Hood Mysticism Scale: Does the presence of a neutral response-item affect response style. *Psychological Reports, 88*, 335-338.

Monceri, J. T. (2012). Bias in the nursing workplace: Implications for the Latino(a) nurses. *Journal of Cultural Diversity, 19*, 94-101.

Morren, M., Gelissen, J. P. T. M., & Vermunt, J. K. (2011). Dealing with extreme response styles in cross-cultural research: A restricted latent class factor analysis approach. *Sociological Methodology, 41*, 13-47.

National Database of Nursing Quality Indicators® (2008). *RN Survey and Scoring Guide.* Kansas City: NDNQI®

Panda, M. (2008). Perspectives on the influence of work values in the development of organizational commitment. *Indian Journal of Industrial Relations, 43*, 419-437.

Pasca, R. & Wagner, S. L. (2011). Occupational stress in the multicultural workplace. *Journal of Immigrant Minority Health, 13*, 697-705. doi: 10.1007/s10903-011-9457-6

Pena, E. D. (2007). Lost in translation: Methodological considerations in cross-cultural research. *Child Development, 78*, 1255-1264. doi: 10.1111/j.1467-8624.2007.01064.x

Pittman, P. (2013). Nursing workforce education, migration and the quality of healthcare: A global challenge. *International Journal for Quality in Health Care, 25*, 349-351. doi: 10.1093/intqhc/mzt048

Press Ganey Associates, Inc. (2014A). *About NDNQI®: Frequently asked questions*. *NDNQI®: A Press Ganey Solution.* Last Retrieved October 2014. http://www.nursingquality.org/FAQ#faq-about

Press Ganey Associates, Inc. (2014B). *Press Ganey Acquires National Database of Nursing Quality Indicators (NDNQI®). Press Ganey.* Last Retrieved October 2014. http://pressganey.com/pressRoom/2014/06/10/press-ganey-acquires-national-database-of-nursing-quality-indicators-(ndnqi-)

Press Ganey Associates, Inc. (2014C). *About NDNQI: Turn quality data for your hospital into solutions you can use. NDNQI: A Press Ganey Solution.* Last Retrieved October 2014. http://www.nursingquality.org/About-NDNQI/Quality-Data-Solutions#intro

Raju, D., Su, X., & Patrician, P. A. (2014). Using item response theory models to evaluate the Practice Environment Scale. *Journal of Nursing Measurement, 22*, 323-341. doi: 10.1891/1061-3749.22.2.323

Schimmack, U., Oishi, S., & Diener, E. (2005). Individualism: A valid and important dimension of cultural differences between nations. *Personality and Social Psychology Review, 9*, 17-31. doi: 10.1207/s15327957pspr0901_2

Schlesselman, J. J. & Stolley, P. D. (1982). *Case-Control Studies: Design, Conduct, Analysis.* New York: Oxford University Press, Inc.

Schlomer, B. J., & Copp, H. L. (2014). Secondary data analysis of large data sets in Urology: Success and errors to avoid. *The Journal of Urology, 191*, 587-596. doi: 10.1016/j.juro.2013.09.091

Schwartz, S. H. (1992). Universals in the content of structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology, 25*, 1-65.

Schwartz, S. H. (1999). A theory of cultural values and some implications for work. *Applied Psychology: An International Review, 48*, 23-47.

Schwartz, S. H. (2012). An overview of the Schwartz Theory of Basic Values. *Online Readings in Psychology and Culture, 2*(1). Retrieved from http://dx.doi.org/10.9707/2307-0919.116

Schwartz, S. H. (2012a). A Theory of Cultural Values and some implications for work. *Applied Psychology: An International Review, 48*, 23-47.

Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fisher, R., Beierlein, C., Ramos, A.,…..Konty, M. (2012). Refining the Theory of Basic Individual Values. *Journal of Personality and Social Psychology, 103*, 663-688. doi: 10.1037/a0029393

Schwartz, S. J., Waterman, A. S., Umana-Taylor, A. J., Lee, R. M., Kim, S. Y., Vazsonyi, A. T.,…..Williams, M. K. (2013). Acculturation and well-being among college students from immigrant families. *Journal of Clinical Psychology, 69,* 298-318. doi: 10.1002/jclp.21847

Seago, J. A. & Spetz, J. (2008). Minority nurses' experiences on the job. *Journal of Cultural Diversity, 15*, 16-23.

Sese-Abad, A., De Pedro-Gomez, J., Bennasar-Veny, M., Sastre, P., Fernandez-Dominguez, J. C., & Morales-Ascencio, J. M. (2014). A multisample model validation of the Evidence-Based Practice Questionnaire. Research in Nursing & Health, 37, 437-446. doi: 10.1002/nur.21609

Sindik, J. (2012). Data analysis strategies for reducing the influence of the bias in cross-cultural research. *Collegium Antropologicum, 36*, 31-37.

Smith, P. B. (2004). Acquiescent response bias as an aspect of cultural communication style. *Journal of Cross-Cultural Psychology, 35*, 50-61. doi: 10.1177/0022022103260380

Sousa, K. H., West, S. G., Moser, S. E., Harris, J. A, & Cook, S. W. (2012). Establishing measurement invariance: English and Spanish Paediatric Asthma Quality of Life Questionnaire. Nursing Research, 61. 171-180. doi: 10.1097/NNR.0b013e3182544750

Steiger, D. M., Bausch, S., Johnson, B., Peterson, A., Arens, Z. (n.d.). *The registered nurse population: Findings from the March 2004 National Sample Survey of Registered Nurses*. U.S. Department of Health and Human Services. http://bhpr.hrsa.gov/healthworkforce/rnsurveys/rnsurvey2004.pdf

Stimpfel, A. W., Rosen, J. E., & McHugh, M. D. (2014). Understanding the role of the professional practice environment on quality of care in Magnet® and non-Magnet hospitals. *The Journal of Nursing Administration, 44,* 10-16. doi: 10.1097/NNA.0000000000000015

Stommel, M., Wang, S., Given, C. W., & Given, B. (1992). Confirmatory factor analysis as a method to assess measurement equivalence. Research in Nursing & Health, 15, 399-405.

Stubenrauch, J. M. (2010). Working conditions at Magnet hospitals. *American Journal of Nursing, 110,* 16-17.

Teresi, J. A. (2006). Overview of quantitative measurement methods: Equivalence, invariance, and differential item functioning in health applications. *Medical Care, 4*, S39-S49.

U.S. Census Bureau, Population Division (2014). Annual estimates of the resident population by sex, race, and Hispanic origin for the Unites States, states, and counties: April 1, 2010 to July 1, 2013. *United States Census Bureau*. Last retrieved August 2014. http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

U.S. Department of Health and Human Services, Health Resources and Services, & National Center for Health Workforce Analysis (2014). Highlights from the 2012 National Sample Survey of Nurse Practitioner. Rockville, Maryland: U.S. Department of Health and

Human Services. Last retrieved October 2014. http://bhpr.hrsa.gov/healthworkforce/supplydemand/nursing/nursepractitionersurvey/npsurveyhighlights.pdf

Van Herk, H., Poortinga, Y. H., & Verhallen, T. M. (2004). Response styles in rating scales: Evidence of method bias in data from six EU countries. *Journal of Cross-Cultural Psychology, 35*, 346-360. doi: 10.1177/0022022104264126

Varsi, C., & Ruland, C. M. (2009). Congruence between nursing problems in nursing care plans and NANDA nursing diagnoses. *Connecting Health and Human.* 778 -779. doi: 10.3233/978-1-60750-024-7-778

Wacholder, S., Silverman, D. T., McLaughlin, J. K., & Mandel, J. S. (1992). Selection of controls in case-control studies. *American Journal of Epidemiology, 135*, 1042-1050.

Windle, P. E. (2010). Secondary data analysis: Is it useful and valid? *Journal of PeriAnesthesia Nursing, 25*, 322-324. doi: 10.1016/j.jopan.2010.07.005

Yu, F. (2008). The expatriate experience: Teaching nursing across eastern and western cultures. *Journal of Nursing Scholarship, 40*, 184-186.

Zax, M., & Takahashi, S. (1967). Cultural influences on response style: Comparisons of Japanese and American college students. *The Journal of Social Psychology, 71*, 3-10.

Appendices

Appendix A

Table A

Configural (Equal Form) Invariance: Latent Factors Means and Variances Across Groups

	M		*Variances*	
	RNs- API	RNs-WNH	RNs-API	RNs-WNH
Latent Factors	Fixed Factor Variance Method of Scaling			
StaffRes:	0	0	1	1
HospAff:	0	0	1	1
QualCare:	0	0	1	1
NursMana:	0	0	1	1
NursPhy:	0	0	1	1
	Marker Indicator Method of Scaling			
StaffRes:	0	0	.363	.370
HospAff:	0	0	.252	.247
QualCare:	0	0	.200	.207
NursMana:	0	0	.325	.407
NursPhy:	0	0	.187	.213

Note. API = Asian/Pacific Islander; WNH= White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare= Quality Care; NursMana = Nurse Manager; NursPhy = Nurse Physician.

Appendix B

Table B

Configural Invariance: Unstandardized Factor Loading and Intercept Patterns Across Groups for the Marker Indicator Method of Scaling

Latent Factor by	Factor Loadings		Intercepts	
Indicator	RNs-API	RNs-WNH	RNs-API	RNs-WNH
StaffRes:				
SR1	1[2]	1[2]	2.865[3]	2.672[3]
SR2	.855[1]	.828[1]	2.913[4]	2.875[4]
SR3	1.141[4]	1.198[4]	2.764[2]	2.609[2]
SR4	1.135[3]	1.186[3]	2.654[1]	2.51[1]
HospAff:				
HA1	1[3]	1[3]	3.088[8]	2.995[8]
HA2	1.119[7]	1.183[7]	2.9[4]	2.77[4]
HA3	1.099[6]	1.159[6]	2.76[1]	2.595[1]
HA4	.838[2]	.877[2]	**3.05[7]**	**2.959[6]**
HA5	1.06[5]	1.045[5]	3.016[5]	2.849[5]
HA6	1.256[9]	1.327[9]	2.833[2]	2.67[2]
HA7	1.02[4]	1.033[4]	**3.032[6]**	**2.995[7]**
HA8	.787[1]	.753[1]	3.242[9]	3.273[9]
HA9	1.158[8]	1.236[8]	2.863[3]	2.702[3]
QualCare:				
QC1	**1[7]**	**1[8]**	3.189[7]	3.092[7]
QC2	.73[1]	.733[1]	3.403[10]	3.388[10]
QC3	1.058[10]	1.093[10]	**3.13[4]**	**3.036[5]**
QC4	.853[2]	.767[2]	3.248[8]	3.26[8]
QC5	**1.023[8]**	**0.983[7]**	**3.086[1]**	**3.032[4]**
QC6	.867[3]	.78[3]	3.357[9]	3.334[9]
QC7	1.054[9]	1.046[9]	3.129[3]	3.028[3]
QC8	**.91[5]**	**.842[4]**	**3.15[6]**	**3.011[2]**
QC9	.965[6]	.938[6]	**3.142[5]**	**3.073[6]**
QC10	**.887[4]**	**.857[5]**	**3.119[2]**	**2.892[1]**
NursMana:				
NM1	1[3]	1[3]	3.104[3]	3.026[3]
NM2	.987[1]	.927[1]	3.021[2]	2.965[2]
NM3	1.055[5]	1.079[5]	3.195[5]	3.126[5]
NM4	.991[2]	.964[2]	2.934[1]	2.768[1]
NM5	1.047[4]	1.061[4]	3.126[4]	3.088[4]
NursPhy:				
NP1	1[1]	1[1]	3.121[3]	3.101[3]
NP2	1.266[3]	1.263[3]	3.033[1]	2.991[1]
NP3	1.186[2]	1.18[2]	3.048[2]	2.998[2]

Note. API = Asian/Pacific Islander; WNH= White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare= Quality Care; NursMana = Nurse Manager; NursPhy = Nurse Physician.

Appendix C

Table C

Metric Invariance: Unstandardized Factor Loadings Across Groups for Marker Indicator Method of Scaling

Latent Factor BY Indicator	Factor Loadings	
	RNs-API	RNs-WNH
StaffRes:		
SR1	1	1
SR2	.835	.835
SR3	1.183	1.183
SR4	1.172	1.172
HospAff:		
HA1	1	1
HA2	1.163	1.163
HA3	1.14	1.14
HA4	.865	.865
HA5	1.049	1.049
HA6	1.304	1.304
HA7	1.029	1.029
HA8	.762	.762
HA9	1.211	1.211
QualCare:		
QC1	1	1
QC2	.732	.732
QC3	1.081	1.081
QC4	.793	.793
QC5	.995	.995
QC6	.806	.806
QC7	1.048	1.048
QC8	.865	.865
QC9	.946	.946
QC10	.867	.867
NursMana:		
NM1	1	1
NM2	.942	.942
NM3	1.072	1.072
NM4	.971	.971
NM5	1.057	1.057
NursPhy:		
NP1	1	1
NP2	1.264	1.264
NP3	1.182	1.182

Note. API = Asian/Pacific Islander; WNH= White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare= Quality Care; NursMana = Nurse Manager; NursPhy = Nurse Physician.

Appendix D

Table D

Strong (Scalar) Invariance: Unstandardized Factor Loadings and Intercepts Across Groups for Marker Indicator Method of Scaling

	Factor Loadings		Intercepts	
Latent Factor BY Indicator	RNs-API	RNs-WNH	RNs-API	RNs-WNH
StaffRes:				
SR1	1	1	2.69	2.69
SR2	0.825	0.825	2.856	2.856
SR3	1.178	1.178	2.61	2.61
SR4	1.167	1.167	2.508	2.508
HospAff:				
HA1	1	1	2.992	2.992
HA2	1.165	1.165	2.773	2.773
HA3	1.147	1.147	2.609	2.609
HA4	0.866	0.866	2.96	2.96
HA5	1.056	1.056	2.867	2.867
HA6	1.309	1.309	2.679	2.679
HA7	1.023	1.023	2.974	2.974
HA8	0.752	0.752	3.242	3.242
HA9	1.216	1.216	2.713	2.713
QualCare:				
QC1	1	1	3.095	3.095
QC2	0.726	0.726	3.373	3.373
QC3	1.08	1.08	3.036	3.036
QC4	0.784	0.784	3.235	3.235
QC5	0.991	0.991	3.022	3.022
QC6	0.8	0.8	3.32	3.32
QC7	1.048	1.048	3.031	3.031
QC8	0.87	0.87	3.033	3.033
QC9	0.944	0.944	3.069	3.069
QC10	0.88	0.88	2.944	2.944
NurMan:				
NM1	1	1	3.026	3.026
NM2	0.941	0.941	2.96	2.96
NM3	1.071	1.071	3.122	3.122
NM4	0.974	0.974	2.795	2.795
NM5	1.054	1.054	3.075	3.075
NurPhy:				
NP1	1	1	3.097	3.097
NP2	1.265	1.265	2.99	2.99
NP3	1.183	1.183	3.001	3.001

Note. API = Asian/Pacific Islander; WNH= White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare= Quality Care; NursMana = Nurse Manager; NursPhy = Nurse Physician.

Appendix E

Table E

S*trong (Scalar) Invariance: Latent Factors Means and Variances Across Groups*

Latent Factors	*M*		*Variances*	
	RNs- API	RNs-WNH	RNs-API	RNs-WNH
	Marker Indicator Method of Scaling			
StaffRes:	.13	0	.354	.379
HospAff:	.103	0	.241	.251
QualCare:	.087	0	.207	.205
NursMana:	.078	0	.329	.405
NursPhy:	.035	0	.188	.212
	Fixed Factor Variance Method of Scaling			
StaffRes:	0	0	.934	1
HospAff:	0	0	.961	1
QualCare:	0	0	1.014	1
NursMana:	0	0	.813	1
NursPhy:	0	0	.885	1

Note. API = Asian/Pacific Islander; WNH= White/Non-Hispanic; StaffRes = Staffing and Resources; HospAff = Hospital Affairs; QualCare= Quality Care; NursMana = Nurse Manager; NursPhy = Nurse Physician.